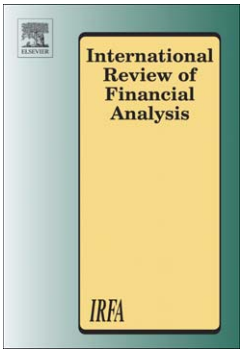
Explaining turn of the year order flow imbalance

Chelley-Steeley, Patricia; Lambertides, Neophytos; Steeley, James M.

DOI:
10.1016/j.irfa.2015.05.028

Document Version
Peer reviewed version

Citation for published version (Harvard):
Chelley-Steeley, P, Lambertides, N & Steeley, JM 2016, 'Explaining turn of the year order flow imbalance', *International Review of Financial Analysis*, vol. 43, pp. 76-95. https://doi.org/10.1016/j.irfa.2015.05.028



Explaining Turn of the Year Order Flow Imbalance

Patricia L. Chelley-Steeley, Neophytos Lambertides, James M. Steeley

PII: S1057-5219(15)00110-6
DOI: doi: 10.1016/j.irfa.2015.05.028
Reference: FINANA 867

To appear in: *International Review of Financial Analysis*

Received date: 20 October 2014
Revised date: 30 April 2015
Accepted date: 31 May 2015

Please cite this article as: Chelley-Steeley, P.L., Lambertides, N. & Steeley, J.M., Explaining Turn of the Year Order Flow Imbalance, *International Review of Financial Analysis* (2015), doi: 10.1016/j.irfa.2015.05.028

Explaining Turn of the Year Order Flow Imbalance.

Patricia L. Chelley-Steeley*, Neophytos Lambertides* and James M. Steeley*

ABSTRACT

The paper provides evidence of a turn of the year effect in the order flow imbalance of both retail and institutional investors. In December there is net selling pressure which is reversed in January. We examine high frequency intraday order flow information and find that the changes in order flow imbalance between December and January are related to firm risk factors and characteristics. We find that retail order flow imbalances are associated with a wide range of risk characteristics including beta, illiquidity and unsystematic risk. Imbalances in institutional order flow are associated with only a small number of risk variables. We show that these order flow changes are important because risk premiums are elevated in January. Our results are robust to the effects of decimalization.

Keywords: order flow imbalance, risk, turn of the year.

Patricia L Chelley-Steeley, Birmingham Business School, Birmingham University, Birmingham, B15 2TY, UK. Tel: 44-121-414-6534. Email: p.l.chelley-steeley@bham.ac.uk.

Neophytos Lambertides, Cyprus University of Technology, Department of Commerce, Finance and Shipping, 3603 Lemesos, Cyprus. Tel: 357-25-002591. Email: n.lambertides@cut.ac.cy.

James M. Steeley, Aston Business School, Aston University, Birmingham, B4 7ET, UK. Tel: 44-121-204-3248. Email: j.m.steeley@aston.ac.uk. Corresponding author.

Acknowledgements: We express our thanks to seminar participants at Colorado State University, conference participants at the 2014 British Accounting and Finance Association Conference and the anonymous reviewer for their helpful comments.

Explaining Turn of the Year Order Flow Imbalance

ABSTRACT

The paper provides evidence of a turn of the year effect in the order flow imbalance of both retail and institutional investors. In December there is net selling pressure which is reversed in January. We examine high frequency intraday order flow information and find that the changes in order flow imbalance between December and January are related to firm risk factors and characteristics. We find that retail order flow imbalances are associated with a wide range of risk characteristics including beta, illiquidity and unsystematic risk. Imbalances in institutional order flow are associated with only a small number of risk variables. We show that these order flow changes are important because risk premiums are elevated in January. Our results are robust to the effects of decimalization.

Keywords: order flow imbalance, risk, turn of the year.

1. Introduction

The aim of this paper is to show that there is a turn of the year seasonality associated with aggregate order flow imbalance so that in December there is net selling pressure but in January net buying pressure. We find that this seasonality is also reflected in the order flow of retail and institutional investors. We use the Institute for the Study of Security Markets (ISSM) and Trade and Quotes (TAQ) database to examine high frequency intraday order flow and show that there are order flow shifts associated with the risk factors and characteristics of firms commonly used in asset pricing models at the turn of the year. Moreover, these order flow shifts are found to be present even after controlling for firm size and tax loss trading incentives which are known to influence year end trading activity. Since there is growing evidence that retail and institutional order flow may have diverse effects on returns and these different types of investors may be motivated to trade for different reasons we examine separately the effect of retail and institutional order flow. We find that the turn of the year order imbalance of retail investors is related to order flow shifts associated with a wide range of risk factors and characteristics. However, institutional order flow changes are associated with relatively few measures of risk.

Our study of order flow at the turn of the year is motivated by the growing literature that highlights the importance of order flow imbalance. As shown by Kyle (1985) the interaction of informed and liquidity traders causes order flow to change in response to new information and provides a link between order flow changes and prices. However, even without information trading order flow can affect prices. Stoll (1978) and Ho and Stoll

(1983) have shown that inventory adjustments arising from order flow changes lead dealers to adjust prices, while Scholes (1972) has shown that when investors do not have perfectly elastic demand curves changes in order flow lead to price changes so that the market can clear.

Hasbrouck and Seppi (2001) use a principal components model to extract common components from order flow information and show that these are correlated with market returns but firm level returns are primarily influenced by their own order flow. Chordia et al (2001) demonstrate that order flow imbalances associated with S&P 500 securities are associated with changes in the market return. Chordia and Subrahmanyam (2004) have shown that daily security returns are influenced by security level order imbalances and provide a theoretical model in support of such a relationship.

The relationship between order flow and returns is well established but much less is known about what leads to order flow changes. Ritter (1988) showed that stock buy-sell ratios of individual investors are lower in December and higher in January. Keim (1989) noted an increase in selling pressure at the end of the tax year, which D'Mello et al (2003) find associated with the propensity to tax loss trade. Ng and Wang (2004) showed that institutions sell more loser stocks during the last quarter of the year and buy more small stocks, both winners and losers in the first quarter. More recently Chordia et al (2007) has studied order imbalance in cross-section and found evidence of day of the week effects and a positive relationship between past market returns and order flow imbalance. We extend this knowledge by examining how the risk features of a firm influence turn of the year order flow imbalance, an issue not previously studied.

We are motivated to examine institutional and retail order flow separately because existing evidence suggests a distinct relationship exists between retail and institutional order flow and returns. Klemkosky (1977) showed that quarterly institutional trading imbalances

are positively associated with contemporaneous abnormal returns. Kraus and Stoll (1972) and Mikkelson and Partch (1985) show that block trades initiated by institutional traders lead to significant price changes as the market absorbs the shift in order flow. More recently, in their cross-section analysis of trading by institutional and retail investors, Griffin, Harris and Topaloglu (2003) find a strong relationship between contemporaneous changes in institutional ownership and daily stock returns. Although most attention has been placed on studying institutional order flow, Barber, Odean and Zhu (2008), Kaniel et al (2008) and Kelley and Tetlock (2013) have all shown recently that retail order flow influences returns.

Moreover a separate examination of retail and institutional traders is motivated by recent evidence that suggests that retail and institutional investors engage in trading for different reasons. There is increasing evidence that large price movements associated with institutional order flow are caused by herding activity, which causes trading in the same direction over time and larger order imbalances that would otherwise be evident, see for example, Wemers (1999) and Nofsinger and Sias (1999). A range of studies have shown that institutional investors earn higher returns than individual investors which suggests that informed trading is more closely associated with institutional trades. Barber, Odean and Zhu (2008) show that order imbalances of individual traders are highly correlated and indicative of herding. Nofsinger and Sias (1999) show that although herding activity is undertaken by individual investors their actions have less price impact than herding by institutions. Kumar and Lee (2006) uses trading records of individual investors to show that buying activity in one stock is positively correlated with buying activity in another so that the trades of individuals are systematically correlated.

In our study, we use the ratio of buyer initiated trades to seller initiated trades as our measure of order flow imbalance and show that there is systematic selling pressure in December but a reversal of this pattern in January. This feature is strongest for retail order

flow but is also evident in institutional order flow. We show that during December, average buy-sell ratios decline reaching their lowest point at the very end of December. They then rise substantially during the first or second day of January. Between the last days of December and the first few days of January, increases in the average buy-sell ratio are largest for small loser firms but a weaker rise is also evident for winner firms. These patterns are particularly noticeable when examining the order flow of retail traders. The analysis of these daily levels of order imbalance explains why the turn of the year return seasonality exists and why risk premiums are elevated in January.

We are also the first to show that increases in the ratio of buyer initiated trades to seller initiated trades, evident when comparing December and January, are influenced by a wide range of firm risk factors and characteristics. In particular, at the end of December, firms that are liquid, have high market beta, high levels of unsystematic risk, or both, face a sharp rise in selling pressure, a pattern that is reversed during the first few days of January.

We formally test the statistical significance of our order flow analysis by estimating a series of fixed effects regression models with interaction dummy variables to isolate the impact of a wide range of risk variables on turn of the year changes in order flow imbalance. The results of these regressions confirm that December to January changes in order flow imbalance are strongly associated with risk variables. For retail trades in winner and loser firms, changes in order flow imbalance are associated with a wide range of risk factors and characteristics but December to January institutional order flow changes is focused on a small number of risk features.

To show that these order flow patterns are important we apply Fama-Macbeth (1973) asset pricing tests to estimate the relationship between expected returns and risk variables. Our cross-section results indicate a January seasonality in the pricing of a wide range of risk characteristics and factors which closely matches the order flow shifts that take place

between January and December.

Our overall results on order flow imbalance are important if the dynamics of order flow imbalance are to be modelled correctly but will also be valuable to ensure a better understanding of order placement strategies. The remainder of this paper is set out as follows. In Section 2 we describe the data and methodologies we employ. Section 3 examines buying and selling activity from the ISSM/ TAQ database and shows that there is high selling pressure in December which abates in January and this activity is related to the risk factors and characteristics of firms. We also present the results from the fixed effects regressions. Section 5 examines the effects of decimalisation. Section 6 provides a summary and conclusion to the paper.

2. Data and Methodology

We use the ISSM and TAQ databases to provide tick-by-tick data for NYSE/AMEX stocks including transaction prices and trade quantities in addition to the history of all stock quotes made. On average there are about five million trades per month for stocks in our sample. We infer the direction of trade by applying the Lee and Ready (1991) algorithm which Lee and Radhakrishna (2000) have shown to be highly accurate at separating buyer and seller initiated trades in equity markets. This requires comparison of the transaction price of each stock trade to the contemporaneous quote in the same stock to ascertain whether a buy or sell trade has taken place. In cases where this trade-quote comparison can not be undertaken, the algorithm classifies buy trades as those that take place on an uptick and sells as those that take place on a downtick (some trades such as those that take place at the opening auction cannot be classified). Using this intraday order flow information, we calculate the number of buyer initiated and seller initiated trades associated with each stock. Our monthly measure of order flow imbalance is an aggregation of buyer initiated trades to seller initiated trades over a calendar month while our daily measure of order flow imbalance

is based on a single days trading activity. We examine the period January 1983 to December 2008 using the ISSM database and TAQ between January 1993 and December 2008[1].The number of stocks varies each year as firms are listed/delisted or move between other exchanges. The average number of firms used each year is 1720; the minimum number being 748 and the maximum 2030.

We analyse each trade on TAQ and classify the trade as retail or institutional using the Lee and Radhakrishna (2000) algorithm which assigns trades below $5,000 as retail and those above $50,000 as institutional. Trades between $5,000 and $50,000 units cannot be classified effectively as both retail and institutional traders will be active within this segment. These cut-offs have been shown by Lee and Radhakrishna (2000) to be accurate enough not to cause mis-assignment problems while and has become the standard way of studying retail and institutional order flow, see for example, Barber et al (2008) who study the effect of retail traders on market returns or Ali et al (2008) who study the effect of institutional trades around earnings releases.

We obtain return, volume and market value information from the CRSP/COMPUSTAT merged database and utilise risk factors and characteristics shown recently by Hasbrouck (2009) and Asparouhova et al (2010) to be important for the determination of returns[2]. We match the market equity data for fiscal year ends in calendar year *t-1* with returns from July of year *t* to June of year *t+1*. This ensures these variables are known when returns are generated. Each stock must have at least 2 years of monthly returns available prior to July in year *t* for the calculation of pre-ranking betas.

We estimate market-wide betas by using the Fama-French (1992) two-step procedure. In June each year, stocks are allocated to one of twenty-five portfolios formed from

[1] We begin in 1983 as ISSM data is first available from this date.
[2] Since order imbalance influences returns we are guided to choose risk factors that are most important for return determination.

independent quintile rankings of size and then individual stock beta estimates (we use between two and five years of prior data, as available, to estimate betas). Monthly percentage portfolio returns are created as the cross-section average of constituent stock returns above the risk free rate. Portfolio betas are estimated using time-series regressions of portfolio returns on the overall market return, the Fama-French HML, SMB, RMW and CMA factors, see Fama and French (1993,1995,2015)[3] . Since Pastor and Stambaugh (2003) provide evidence that systematic illiquidity risk generates a risk premium we also include a market-wide measure of illiquidity risk. Data on market returns and returns to the Fama and French (1993, 2015) HML, SMB, RMA and CMA[4] risk factors are obtained from Kenneth French's website. Our measure of market-wide illiquidity is the innovation variables (ps_innov) based on equation (8) of Pastor and Stambaugh (2003, p.652), that captures a stocks sensitivity to fluctuations in aggregate liquidity. The resulting full-period post rank beta estimates for a portfolio are assigned to each stock contained in that portfolio. βrm is the market beta, βSMB, βHML, βRMW and βCMW are the betas on the Fama-French factors, βPS is the beta on the Pastor-Stambaugh systematic illiquidity factor,

To capture the impact of the small firm premium, shown by Roll (1983) to accrue in January, we incorporate the logarithm of firm size (*SIZE)*, calculated using market capitalization information from the previous year end. In recognition of the pricing of unsystematic risk noted by Fama and MacBeth (1973), Tinic and West (1986) and Ang et al (2006) we also include the standard deviation of residual returns obtained from the market model used to estimate portfolio betas *(Unsyst).* To test for parameter nonlinearities between market risk and expected return, found to be important by both Fama and MacBeth (1973) and Tinic and West (1986), we also include the square of the market beta (βrm^2)

[3] In their 2015 they show that the addition of profitability and investment factors to the three factor model enhances its power to explain cross-sectional returns. They also show that the HML becomes a redundant factor.

[4] The factor RMW is the difference between the returns of diversified portfolios of stocks with high and low profitability. The factor CMA is the difference between the return to diversified portfolios with low and high investment returns.

To reflect developments in the association between liquidity and expected return, we employ the standardised illiquidity ratio (*Illiq)* of Amihud (2002). This is measured as the previous year's annual average of the daily absolute return to volume ratio for a stock, multiplied by 10^6 and scaled by the market-wide average of this ratio across available stocks in that year. In common with Amihud (2002) and later applications that utilize the illiquidity ratio, we exclude from the sample both days of zero volume and any stocks in any year when return or volume data is available for less than 200 days.

To capture the combined effects of tax loss trading and window dressing which predicts that losers are sold in December we include the capital change achieved by firms in the previous tax year[5] as a variable (CAPΔ). This is measured in the same way as Sias and Starks (1997) by using the change in value that arises between January and the last day of November. Since liquid stocks are cheaper to sell quickly the relationship between the size of the capital change and return may depend upon a firm's illiquidity so we include the variable CAPΔ*illiq which is the interaction of the capital change with illiquidity. Since there are greater incentives to tax loss trade and window dress loser firms as shown by D'Mello et al (2003) we include the multiplicative dummy CAPΔ*loser*illiq to capture the incremental effect of illiquidity on firms with capital losses. This has a value of zero if a firm is a winner firm but has a value equal to CAPΔ*loser*illiq for losers.

Using these variables we estimate the following cross-section time series model, using a fixed effects linear regression to determine if turn of the year changes in trading volume are associated with firm characteristics.

[5] Rozeff and Kinney (1976) Givoly and Ovadia (1983), Reinganum (1983) and Roll (1983) suggested tax loss trading which involves tax liable investors selling loser stocks in December to minimize their capital gains tax bill. Brown et al (1996) and Chevalier and Ellison (1997) suggested that institutional investors sell badly performing investments at the end of the calendar year to improve their profile .

$$\boldsymbol{y}_t = \boldsymbol{X}_t\boldsymbol{\gamma} + \boldsymbol{D}_t'\boldsymbol{X}_t\boldsymbol{\lambda} + \boldsymbol{\varepsilon}_t \qquad (1)$$

In equation (1) $\boldsymbol{y_t}$ is the $n_t \times 1$ vector cross-section of the dependent variable in month t, where n_t is the number of firm observations in month *t*. This variable measures the change in monthly order flow imbalance. We estimate the model three times allowing the change in order flow imbalance to be the monthly change in the number of buyer initiated trades relative to all trades, equivalent to the monthly change in the probability of a buyer initiated trade taking place, and the change in monthly seller initiated trades relative to all trades, equivalent to the change in the probability that a sell trade will take place. Our third measure is the change in the ratio of monthly buyer initiated trades scaled by shares outstanding to monthly seller initiated trades scaled by shares outstanding. $\boldsymbol{X_t}$ is the $n_t \times k$ matrix of firm risk characteristics and factors described earlier, $\boldsymbol{\gamma}$ is the $k \times 1$ vector of coefficients (prices of risk) to be estimated. We also include an interaction dummy variable matrix $\boldsymbol{D_t}$ which is the $n_t \times k$ matrix that is a unit matrix if month *t* is January, but is a null matrix if month *t* is not January, and λ is the $k \times 1$vector of coefficients attached to these interaction dummy variables which allow us to determine if the change in turn of the year order flow imbalance is related to risk features. The associated $n_t \times 1$ vector of disturbance terms is $\boldsymbol{\varepsilon_t}$.

To show that changes in order flow associated with risk variables is important we test the relationship between the return to our risk variables and January by adopting the cross-section procedure pioneered by Fama and MacBeth (1973). Each month excess stock returns are regressed against these stock characteristics and the estimated betas from the market-wide factors and risk characteristics. The time series means of monthly regression slopes provided

by each of the coefficients generate standard tests of whether the components of the overall return premium are priced. In order to make month by month asset pricing comparisons we undertake the regressions using only the return information for that month as well as estimating samples that contain all months and all months except January. This allows us to obtain a month by month estimate of the risk premium associated with each risk variable.

3. Order Imbalance at the Turn of the Year

In Table 1 we report the mean, median and standard deviation of monthly buyer initiated, seller initiated and unclassified trades along with traded volume information for our CRSP-ISSM-TAQ sample. The values reported are all normalized by share outstanding information obtained from CRSP. Mean total volume traded across all months is over 202% of shares outstanding. Buyer initiated trades represent 101.82% and seller initiated trades are 96.51%. Comparisons with Campbell et al (2009) who examine the period 1993-2000 indicate a substantial rise in trading activity after 2000[6].

Examining January and December separately shows that trading activity in January is lower than in December and lower than for the average of all months that exclude January. Mean monthly traded volume across all stocks falls sharply in January to 184.01% of shares outstanding while buyer and seller initiated trades fall to 93.14% and 86.00% respectively. In contrast, trading activity in December is higher than in January or the average of all other months, mean December trading volume is 207.00% while buying and selling activity is 103.31% and 99.14% respectively.

3.1 Monthly December and January Buy-Sell Ratios

[6]The period studied by Campbell et al (2009) was 1993-2000. When we examine this same period we find that traded volume and buyer and seller initiated trades are almost identical to values reported in the Campbell study.

In Table 2 we report the mean monthly ratio of buyer initiated trades to seller initiated trades for twenty five groups sorted first by capitalization then by illiquidity. Panel (i) provides results for aggregate order flow, Panel (ii) for retail order flow and Panel (iii) for institutional order flow. Group Illiq1 contains the least illiquid stocks and group Illiq5 contains the most illiquid stocks. The Size 1 group contains the smallest firms and the Size 5 group contains the largest firms[7]. Averages are reported using all months, all months except January and for January and December separately. A value above (below) unity arises when buyer initiated (seller initiated) trades exceed seller initiated (buyer initiated) trades giving rise to buying (selling) pressure. The all month sample indicates that the average buy-sell ratios of all Illiq1 to Illiq3 groups are below unity but above unity for almost all Illiq4 and Illiq5 suggesting that liquid stocks are in general characterized by less buying pressure[8].

Panel (i) shows that average December buy-sell ratios are depressed relative to January. For example, during December the mean buy-sell ratio of the small size-low illiquidity firms is 0.7922 rising to 0.9980 in January. We also find that December selling pressure diminishes for each size group as firms become more illiquid. Despite low buy-sell ratios for liquid stocks the December buy-sell ratio of the smallest but most illiquid firms is 0.9698 suggesting that buyer and seller trades are almost balanced. For large firms (those in Size 5) there is no evidence of selling pressure in December as the mean buy-sell ratios of all illiquidity groups are above unity and higher than their January values. Figure 1 provides a visual representation of the changes in the buy-sell ratio that arise between December and January for the five groupings showing a large increase in the mean buy-sell ratio of small firms between December and January. Panel (ii) shows that for retail trades the average December buy-sell ratio are lower than for January and the December-January differences are largest for small firms. Panel (ii) shows that December-January differences in institutional

[7] We separately examine firms based on firm size because tax loss trading has been shown to be more prevalent in smaller stocks while liquidity will determine how easy it is to sell at the end of the year.

order flow imbalance are much smaller than evident in retail order flow.

3.2 Daily December and January Buy-Sell Ratios by Risk Characteristic

Motivated by these striking patterns associated with order flow imbalance, we examine the ratio of buy trades to sell trades during the last twenty days of December and first twenty days of January for stocks sorted on the basis of each risk characteristic[9]. We first examine the buy-sell ratios of five groups sorted by firm size. These are presented in separately Figure 2(i) for loser firms and in Figure 2(ii) for winner firms. Panel (i) indicates that at the start of December there is selling pressure for the small firm group but buying pressure for the large firm group. During December there is a decline in the average buy-sell ratio of each group which is sharpest at the very end of December. On the first day of January the buy-sell ratio rises sharply. These changes increase in magnitude as the size of firms in the grouping falls. Panel (ii) indicates that this turn of the year pattern is weaker for winner firms but is nevertheless observable.

We next divide the sample of firms in each size group into five further divisions based on the size of risk variables. For brevity in Figure 5 panels we plot the average buy-sell ratio for the four extreme coordinates of the twenty five portfolios, i.e. the highest and lowest risk groups for the smallest and largest capitalization quintile[10]. Overall our results show that for loser firms there is a decline in buy-sell ratios during December followed by a sharp rise in the buy-sell ratio in early January. These patterns are found to be linked to the size of some risk characteristics and factors.

In Panel A of Figure 3 we present plots of turn of the year average buy-sell ratios for

[9] As shares outstanding is only observed monthly, these plots present the average of buyer initiated trades to seller initiated trades without being scaled by shares outstanding.

[10] We only trace out the extreme size and risk groups for brevity as information on all twenty five groups is too great to be displayed. However, these fewer examples are sufficient to demonstrate that for each risk characteristic there is year end selling and January buying pressure for loser firms which is much reduced but not entirely absent for winner firms.

small-liquid and small-illiquid firms and for large-liquid and large-illiquid firms. Panel (i) and (ii) refers to plots for loser and winner firms respectively. Panel A(i) indicates that for loser firms throughout most of December the buy-sell ratio of the small firm-high liquidity group is below 0.8, falling to 0.53 on the last day of December before rising sharply to 1.1417 on the first day of January. The average buy-sell ratio of the small firm-high illiquidity group declines to 0.7710 two days before the end of December rising to 1.1684 on day two of January. For larger firms the reversal in the buy-sell ratio is more modest. Consideration of Panel A(ii) suggests that even for the winner firms there are turn of the year changes in order flow imbalance.

Panels B (i) and (ii) contain the December-January plots for small and large firm groups of high and low beta firms[11] which shows that market risk is associated with order flow shifts between December and January. Panel (i) shows that for loser firms between the last day of December and the first day of January the buy-sell ratios of the small firm-large beta group rise from 0.5772 to 1.2095, a smaller change is evident for the small firm low beta group as the ratios change from 0.8696 to 1.1799. For the large firm- small beta group the order flow imbalance seems unrelated to the turn of the year but for the large firm-large beta group there is a slight rise in the buy-sell ratio between December and January. December average buy-sell ratios for winner firms are higher during December than for loser stocks, however these ratios fall towards the end of December for large beta groups.

Panels C(i) and (ii) plot average buy-sell ratios for the SMB beta, panels D(i) and (ii) for the HML beta, panels E(i) and (ii) for the RMW beta, panels F (i) and (ii) for the CMA beta and panels G(i) and (ii) for the PS beta and show smaller shifts in order flow imbalance than was evident for market beta at the turn of the year. Panels H(i) and (ii) show plots for unsystematic risk and indicates large shifts in the order flow of firms with high unsystematic

[11] The (β^2_{rm}) parameter provides identical plots as beta and beta squared provides identical rankings.

risk between December and January. The small firm-large unsystematic risk group experiences a rise in the buy-sell ratio from 0.6485 to 1.1250 at the turn of the year and the small firm-small unsystematic risk group experiences a rise from 0.7346 to 1.0367. Smaller changes to turn of the year buy-sell ratios are also associated with the unsystematic risk of large firms. For winner firms at the end of December there is a drop in the buy-sell ratio is followed by a January rise.

In Figure 4 we present plots of the buy-sell ratio using retail order flow information for five size formed groups and in Figure 5 the buy-sell ratio calculated from institutional order flow information is shown for five size based groups. Figure 4 shows a large reduction in the buy-sell ratio of each group at the end of December which is reversed at the beginning of January. This reversal in order flow is largest for loser firms but also apparent in winner firms. Figure 5 shows that there is a weaker and less obvious change in institutional order flow between December and January for losers but a more noticeable change in order flow for winners.

The December-January plots highlight a range of new contributions. During December, average buy-sell ratios of small firms are lower than for large firms but rise substantially during January. Between the last days of December and the first few days of January increases in the average buy-sell ratio are strongest for small firms that are losers but a weaker tendency for the average buy-sell ratio to rise at the turn of the year is also evident for winner firms and for large firms. This suggests that the turn of the year changes in order flow imbalance can not be fully explained by tax-loss trading or window dressing. We also show that the size of the December decline in the buy-sell ratio is related to the size of some risk characteristics and factors, in particular the market beta, illiquidity and unsystematic risk. In January this selling activity is reversed.

In Table 3 we present results from the estimation of our fixed effect regressions outlined by equation (1) which shows that even after controlling for firm size and other variables we still find evidence of order flow imbalance associated with risk variables. Panel (i) presents results for aggregate order flow, Panel (ii) for retail order flow and Panel (iii) for institutional order flow. Panel A presents results for all firms, Panel B for loser firms and Panel C for winner firms. In these panels the first set of coefficients capture the relationship between changes in monthly order flow imbalance and risk characteristics and factors, while the second set of coefficients capture the incremental impact of these risk variables.

Panel A(i) shows that on average across all months there is a positive association between size and monthly changes in buying activity (ratio of buy trades to all trades). This means that an important determinant of net buying activity is firm size. However, this is the only risk variable that has a month by month effect on buying activity and therefore order imbalance. The turn of the year interaction variables indicate that a wide range of risk characteristics influence changes in order imbalance between December and January. Illiquidity, size, βrm^2, βSMB, βRMW and βPS are all negatively signed suggesting that lower illiquidity, smaller firms, and smaller SMB and RMW betas are associated with larger changes to turn of the year buying activity. We also find that market betas and unsystematic risk are positively signed indicating that higher values are associated with greater December to January increases in the buy ratio. December to January changes in buying activity are negatively associated with ΔCAP indicating that firms with larger capital losses experience larger increases in buying activity at the turn of the year while CAP*Illiq reduces the magnitude that a negative capital gain has on activity. But when firms are losers and illiquid the impact of the capital loss on trading activity increases.

The results associated with changes in selling activity (ratio of sell trades to all trades)

provide corroborative results as they are symmetric (but opposing in sign). Consistent results also arise when order flow imbalance is defined by changes in the buy-sell ratio. Panel A(ii) presents evidence that turn of the year changes in retail order flow imbalance are related to risk variables as turn of the year interaction coefficients for many of the risk characteristics and factors are significant. In particular, when examining buying activity the turn of the year interactions for illiquidity, size, the βrm^2,βSMB and βRMW factors suggest an inverse relationship between their values and the December-January change in buying activity. The market beta and unsystematic risk are positively signed and especially strong suggesting that in December there is an increase in selling pressure that is reversed in January for stocks with high betas and high unsystematic risk. We also confirm previous evidence provided by Hvidkjaer (2001) that suggests that the size of the capital loss may influence turn of the year order flow as ΔCAP is negatively signed suggesting that December-January changes in the buy ratio are smaller for firms that have positive capital gains and larger if firms have negative capital gains. Panels B(ii) and C(ii) shows that for both winners and losers turn of the year interaction risk variables influence changes in turn of the year buying activity.

Panel A(iii) shows that for institutional order flow imbalance a smaller number of risk variables influence December-January changes in order flow as only $\beta_{rm,}$ βSMB, βCMA and size are significant at a 5% level or lower. Moreover, when we examine loser and winner firms separately, we find that market risk and βCMA are only significant for loser firms and not for winners. We also find that for winners higher capital gains increase the change in December-January buying pressure but capital losses have no additional impact for losers. We find broadly consistent results when using the ratio of sell trades to all trades and when we use the buy-sell ratio.

4. Turn of the Year Risk Premiums

We next show that the shifts in order flow imbalance that we have detected, that are

associated with the risk features of firms, are important for returns. Table 4 contains estimates of the risk premia on a month by month basis. The first two sets of coefficients report results obtained using all months, all months except January and each month separately[12]. The Fama-MacBeth regression coefficients indicate a strong seasonality in the relationship between risk and return as January is distinctive in pricing most risk variables but when January is excluded few of the risk variables are priced. There is no risk premium associated with illiquidity in the "All Months" sample. However, in January liquid firms earn higher returns than illiquid ones and when January is excluded there is a positive premium associated with illiquidity indicating a clear seasonality. Market risk and its non-linear counterpart are positively and negatively priced respectively, both in January and in the "All Months" sample. The January market risk premium stands out as being particularly large as the January coefficient is over eight times larger than for the "All Months" sample. When January is excluded neither market risk nor the squared version is significantly priced.

The SMB factor is not priced in January but is priced across all months. There is no seasonal component to the HML beta which is insignificant in January and during all months. The market-wide illiquidity risk factor, βPS, is positively priced in January but is negatively priced in the sample that excludes January. There is a seasonality in the RMW beta as it is unpriced across all months, positive (at a 10% level) when January is excluded but negative and significant during January. There is no seasonality evident for the CMA beta as this risk factor is negatively priced in the all months sample and when January is excluded. However, there is no January premium associated with the CMA beta. Small firms earn a large premium in January but when January is excluded there is no size related premium. Unsystematic risk is negatively priced in months that exclude January, a finding consistent with Ang et al (2006) who studied the relationship between unsystematic risk and return.

[12] In each table, t-statistics are computed using Newey-West (1987) adjustments to the standard errors to correct for serial-correlation of up to twelve months and heteroskedasticity.

However, in January, unsystematic risk is positively priced so that firms with larger unsystematic risks outperform firms with smaller unsystematic risks.

The previous year's capital change has a notable influence on monthly returns. In January positive capital changes lead to negative returns while negative capital changes lead to positive returns, a pattern consistent with tax loss trading and window dressing. In the sample that excludes January; positive capital gains earn positive returns while negative capital gains earn negative returns. This is consistent with the continuation of a declining share price or momentum; see for example Jegedeesh and Titman (1993). The size of the January return associated with capital changes is not influenced by illiquidity but is influenced by illiquidity if firms are also losers, as loser firms that are more liquid earn a return premium[13].

To gauge how our results might influence investor profits we examine how December imbalances between buyer and seller initiated trades influence month by month risk adjusted returns out of sample. We estimate the risk coefficients between January 1983 and December 2000. At the end of December 2000 we group stocks into two halves based on their December buy-sell ratio, those securities with a low buy-sell ratio (higher levels of seller initiated trades but lower levels of buyer initiated trades) and those with a high buy-sell ratio (higher buyer initiated trades lower seller initiated trades). We then implement a strategy to

[13] To determine whether the monthly risk premium coefficients and therefore the price of risk displays seasonality, we also estimate the following linear regression separately for each of the coefficients from the cross section regressions.

$$\gamma_{jt} = \delta_{1j} + \sum_{i=2}^{12} \delta_{ij} D_{it} + \varepsilon_{jt}$$

The dependent variable, γ_{jt} is the price of risk coefficient for each month t (t=1,2,...,12) on the j^{th} beta or characteristic in the cross section regression, (j=1,2,...,11). The explanatory variables, D_{2t}-D_{12t} are binary variables representing the months of the year, February to December. The intercept δ_{1t} captures the average values of γ_{jt} estimates in January and the coefficients $\delta_{2j} - \delta_{12j}$ measure differences between the means in January and other months. For all significant risk variables we find that the premium is significantly different in January.

buy the stocks with a low buy-sell ratio and sell the stocks with a high buy-sell ratio. We use the estimated risk coefficients up to December 2000 and the associated characteristics and factors to calculate the risk adjusted return to each stock in the following month. We then calculate the average abnormal return to the Low-High portfolio. Each month we roll forward this procedure by one month until the end of December 2008. On average January excess returns are 2.5% (p-value of 0.01) while the December returns are 2.2% (p-value is 0.04). We also find that a small part of the January excess return is reversed in February as returns are -0.002. In no other month are excess returns to this strategy statistically significant. This result provides further confirmation of the presence of a trading related January-December seasonal return.

The results we present in this section corroborate earlier work that has shown that during January risk premiums are elevated, a discovery first noted for market beta and unsystematic risk by Tinic and West (1984.1986). Moreover, we have shown that the elevation of January risk features in more recent data than used previously and in asset pricing models that are more fully specified.

5. The Effects of Decimalisation

Within the period we examine, two important changes took place to the trading environment. On January 29, 2001 the NYSE introduced decimal pricing[14] and reduced the minimum tick size to one per cent. These changes, coupled with the development of high speed telecommunications networks and interconnected trading platforms, has facilitated the growth of high frequency trading. The introduction of new electronic trading platforms and the increasing use of automation have had important effects on trading behaviour. Bessembinder (2003) shows that decimalisation led to a reduction in absolute and effective

[14] Decimalization actually took place in four stages. Seven stocks traded by one specialist converted to decimal pricing in August 2000, 57 stocks on September 25 2000, 94 stocks on December 4th and the remaining stocks January 29 2001.

spreads which was concentrated in the most active securities. In the aftermath of decimalisation, Chakravarty, Van Ness and Van Ness (2005) report a shift in the nature of trading activity and an increase in both the number of trades and trading volume associated with small firm stocks. Ricker (1998), and Bacidore, Battalio and Jennings (2001) find that decimalisation improved NYSE liquidity but large traders used more cautious execution strategies as automation increased.

The use of algorithmic trading to make trading decisions such as order submission, execution and cancellation has grown since the 1990's but has seen its greatest rise since decimalisation. By 2009 high frequency trading accounted for 79% of trading volume in the US. Hendershott, Jones and Menkveld (2011) find that in normal market conditions high frequency trading increases liquidity and reduces spreads[15] on the NYSE. Menkveld (2013) has shown that the introduction of a single high frequency trader on Chi-X reduced spreads in Dutch stocks. Broggard (2011) also found that high frequency trading reduced spreads but noted that spread reductions were more prevalent in large stocks. Angel, Harris and Spatt (2010) have shown that the average trade size has fallen from 700 shares in 2004 to about 300 shares in 2009. This is consistent with institutional investors making greater use of algorithms to break up large positions.

We estimate the panel regressions again for the periods 1983-2000 and 2001-2008 which equates to pre and post decimalisation periods. We do not provide the results for brevity[16]. The results show that recent changes in trading patterns have influenced the relationship between the changes in monthly order flow and risk characteristics. However, our key discovery that there are order flow changes associated with the risk features of firms remains robust. After decimalisation risk measures are still significant, displaying the same

[15] Although evidence is accumulating that high frequency trading can trigger "liquidity black-holes" and contribute to sell offs.

[16] The results are available on request from the authors.

signs as during the period 1983-2000, although the strength of the relationship appears to be slightly weaker. In the period 1983-2000 for loser stocks there is risk shifting across a wide range of variables at the turn of the year but this diminishes in the post decimalisation period. For winners comparisons of the pre and post decimalisation periods are more similar. In particular, as well as beta and unsystematic risk being sources of risk shifting activity for winners, in the 2001-2008 period being small still has an important influence over changes in buying activity between December and January.

6. Summary and Conclusions

Our pioneering longitudinal study uses high frequency trading information to show that a turn of the year effect exists in order flow imbalance that can be linked to shifts in order flow associated with the risk characteristics of firms. By using the ratio of buyer initiated trades to seller initiated trades, a measure of relative buying and selling pressure, we show that buy-sell ratios are depressed at the end of the year and rise at the start of the year. A pattern that is stronger for losers than for winner firms. This is an important discovery as systematic changes in order flow imbalance linked to the features of firms have not been previously identified.

We use the Lee and Radhakrishna (2000) algorithm to partition retail and institutional trades, allowing us to discover whether these changes are caused by retail or institutional order flow. We find that order flow shifts associated with risk features is associated with both retail and institutional order flow but the nature of the association between order flow changes and risk features differ for retail and institutional trades.

Our results suggest a range of future research agendas. First, since we find that the trading patterns of individuals are highly influential in the behaviour of overall returns it seems important to examine more closely the diverse effects that retail and institutional

traders have on return behaviour. Second, the risk shifting patterns we have discovered need to be examined more closely, perhaps through survey analysis of traders to gain better insights for why these order flow shifts occur.

References

Ali, A., S. Klasa and O. Li (2008), Institutional stakeholding and better informed traders at earnings announcements, Journal of Accounting and Economics 46, 47-61.

Amihud, Yakov, (2002). Illiquidity and stock returns: cross-section and time-series effects. Journal of Financial Markets 5, 31-56.

Ang, A., R Hodrick, Y. Xing and X. Zhang, (2006). The cross section of volatility and expected returns. The Journal of Finance, 61, 259-299.

Angel J., L. Harris and C., Spatt (2010), Equity trading in the 21st century. Working paper Marshall School of Business.

Asparouhova, E., Bessembinder, H., and I., Kalcheva, (2010). Liquidity biases in asset pricing tests. Journal of Financial Economics 96, 215-237.

Bacidore, J., R., Battalio and R. Jennings, (2001), Changes in order characteristics, displayed liquidity and execution quality on the New York Stock Exchange around the switch to decimal pricing, New York Stock

Barber, B., T., Odean and N. Zhu, (2008), Do retail trades move markets? Review of Financial Studies, 22 151-185.

Bessembinder, H., (2003) Trade execution costs and market quality after decimalization, Journal of Financial and Quantitative Analysis,

Broggard, J., (2011) The activity of high frequency traders. Working paper University of Washington.

Brown, K.C., W., Van Harlow and L.T., Starks, (1996), Of tournaments and temptations: an analysis of managerial incentives in the mutual fund industry. Journal of Finance 51, 85-110.

Campbell, John, Y., T., Ramadorai and A., Schwartz, (2009). Caught on Tape: Institutional trading stock returns and earnings announcements, Journal of Financial Economics, 92 66-91.

Chakravarty, S., Bonnie F. Van Ness and Robert A. Van Ness (2005). The effect of decimalization on trade size and adverse selection costs, Journal of Business Finance and Accounting, 32, 1063-1081.

Chevalier, J., and G.,Ellison, (1997). Risk taking by mutual funds as a response to incentives. Journal of Political Economy 105, 1167-1200.

Chordia, T., R. Roll, and A. Subrahmanyam, (2000). Commonality in illiquidity. Journal of Financial Economics 56, 3-28.

Chordia, T., Roll, R., Subrahmanyam, A., (2001). Order imbalance, liquidity, and market returns. Journal of Financial Economics 73, 657-689.

Chordia, T., Subrahmanyam, A., (2004). Order imbalance and individual stock returns, Journal of Financial Economics 72, 485-518.

Chordia, T., Huh, Sahn-Wook, Subrahmanyam, A., (2007). The cross-section of order flow imbalance, Review of Financial Studies, 20 709-741.

D'Mello, R., S. Ferris and C., Hwang, (2003). The tax-loss selling hypothesis, market liquidity and price pressure around the turn-of-the-year. Journal of Financial Markets 6, 73-98.

Eckbo, B.E., Norli, O., (2002). Pervasive liquidity risk. Unpublished working paper Dartmouth College.

Fama, E., and K. French, (1992). The cross-section of expected returns. The Journal of Finance 47, 427-465.

Fama, E., and K. French, (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics 33, 3-56.

Fama, E., and K. French, (1995). Size and Book-to-Market factors in earnings and returns. The Journal of Finance 50, 131-155.

Fama, E., and K. French, (2015). A five-factor asset pricing model. Journal of Financial Economics, 116, 1-22.

Fama, E., and MacBeth, James D., (1973). Risk, return and equilibrium: empirical tests. The Journal of Political Economy 71, 607-636.

Givoly, D., and A. Ovadia, (1983). Year-end induced sales and stock market seasonlity. The Journal of Finance 38,171-185.

Griffin, J.M., Harris, J.H. and Topaloglu, S., (2003). The dynamics of institutional and individual trading. Journal of Finance 58 2285-2320.

Hasbrouck, J., (2009). Trading costs and returns for U.S. equities: Estimating effective costs from daily data. Journal of Finance, 64, 1445-1477.

Hasbrouck, J., Seppi, D., (2001). Common factors in prices, order flows and liquidity. Journal of Financial Economics 59, 383-411.

Hendershott, T., C. Jones and A. Menkveld (2011). Does algorithmic trading improve liquidity? Journal of Finance 66, 1-33.

Ho, T., and Stoll, H., (1983). The dynamics of dealer markets under competition. Journal of Finance 38, 1053-1074.

Hvidkjaer, S., (2001). A trade-based analysis of momentum. Working paper University of Maryland.

Kaniel, R.S., Saar, G., and Titman, S., (2008). Individual investor trading and stock returns, Journal of Finance 63 273-310.

Kamstra, M., L. Kramer and M. Levi. (2003). Winter blues: seasonal affective disorder (SAD) stock market returns. American Economic Review 93, 324-343.

Keim, D., (1983). Size-related anomalies and stock return seasonality: Further empirical evidence. Journal of Financial Economics 12, 13-22.

Kelley, E.K. and Tetlock, P.C. (2013). How wise are crowds? Insights from retail orders and stock

returns. Journal of Finance, 68 1229-1265.

Klemkosky, R.C., (1977). The impact and efficiency of institutional net trading imbalances, Journal of Finance, 32, 79-86.

Kraus, A., and Stoll, H.R. (1972). Price impacts of stock trading on the New York Stock Exchange. Journal of Finance 569-588.

Kumar, A., and Lee, C.M.C., (2006). Retail investor sentiment and return comovements. Journal of Finance 61 2451-2486.

Kyle, A., (1985). Continuous auctions and insider trading, Econometrica, 53 1315-1335.

Lee, C.M.C. and B. Radhakrishna (2000). Inferring investor behaviour: Evidence from TORQ data, journal of Financial Markets, v3 2 183-204.

Lee, C.M.C. and M.J. Ready (1991). Inferring trade direction from intraday data , Journal of Finance 46, 733-746.

Menkveld, A., (2013). High frequency trading and the new market makers. Journal of Financial Markets forthcoming.

Mikkelson, W and Partch M. M. (1985). Stock price effects and costs of secondary distributions. Journal of Financial Economics 165-194.

Newey, W., West., K., (1987). A simple, positive-definite, heteroscedasticity and autocorrelation consistent covariance matrix. Econometrica 55, 703-708.

Ng. L., and Q. Wang, (2004). Institutional trading and the turn-of-the-year effect. Journal of Financial Economics 74, 343-366.

Nofsinger, J.R. and Sias R.W., (1999). Herding and feedback trading by institutional and individual investors. Journal of Finance, 54 2263-2295.

Pastor, L., and R. Stambaugh, (2003). Liquidity risk and expected stock returns. The Journal of Political Economy 111, 642-685.

Reinganum, M., (1983). The anomalous stock market behaviour for small firms in January: Empirical test for tax-loss selling effects. Jounral of Financial Economics 12, 89-104.

Ricker, J.P., (1996). Decimal pricing, nickel markets, working paper, 1730 Filbert Street, San Francisco.

Ritter, J., (1988). The buying and selling behavior of individual investors at the turn of the year. The Journal of Finance 43, 701-717.

Roll, R., (1983). Vas ist das? The turn-of-the-year effect and the return premia of small firms. Journal of Portfolio Management 9, 18-28.

Rozeff, M., and W. Kinney, (1976). Capital market seasonality: The case of stock returns. Journal of Financial Economics 3, 379-402.

Scholes, M., (1972). The market for securities: Substitution versus price pressure and the effects of information on share price.

Sias, R.W., L.T., Starks, (1997). Institutions and investors at the turn of the year. Journal of Finance 43,

701-717.

Stoll, H., (1978), The supply of dealer services in securities markets. Journal of Finance 33, 1133-1151.

Tinic, S., and R. West, (1984). Risk and return: January versus the rest of the year. Journal of Financial Economics 13, 561-74

Tinic, S., and R. West, (1986). Risk, return and equilibrium: A revisit. The Journal of Political Economy 94, 126-47.

Wermers, R., (1999). Mutual fund herding and the impact on stock prices, Journal of Finance, 54 581-622.

Table 1: Average Order Flow Imbalance

In this table we report mean, median and standard deviation (S.D) values for the CRSP-ISSM-TAQ sample firms. "Buys" refers to the number of monthly buy trades scaled by shares outstanding; "Sells" refers to the total number of average sell trades scaled by shares outstanding. "Unclassifiable" are the monthly number of unclassified trades scaled by shares outstanding. "Total volume" is monthly traded volume scaled by shares outstanding.

All months			
	Mean	Median	S.D
Buys	101.82%	75.42%	34.39%
Sells	96.51%	71.93%	32.56%
Unclassifiable	4.37%	3.17%	1.52%
Total volume	202.70%	62.46%	30.24%

All Months Except December			
	Mean	Median	S.D.
Buys	101.68%	75.11%	34.38%
Sells	96.27%	71.57%	32.41%
Unclassifiable	4.35%	3.16%	1.50%
Total volume	202.31%	71.94%	32.76%

January			
	Mean	Median	S.D.
Buys	93.14%	67.60%	32.28%
Sells	86.00%	63.35%	29.84%
Unclassifiable	4.86%	3.54%	1.65%
Total volume	184.0%	64.23%	30.47%

December			
	Mean	Median	S.D.
Buys	103.31%	78.80%	34.53%
Sells	99.14%	75.91%	34.14%
Unclassifiable	4.56%	3.24%	1.75%
Total volume	207.00%	75.87%	33.68%

Table 2(i): Average Buy-Sell Ratios-Aggregate Order Flow

In this table we report the mean buy-sell ratio for all CRSP/ISSM-TAQ listed securities. The buy- sell ratio is based on the average number of buyer initiated trades in a month scaled by shares outstanding to the average number of seller initiated trades per month scaled by shares outstanding. Buyer and seller initiated trades are identified by using the Lee and Ready (1993) algorithm. January and December panels provide buy-sell ratios for January and December separately. "All months" is the average across all months and All months except December uses all months but not December to calculate the average buy-sell ratio. Groups are first sorted on the basis of size then sorted on the basis of the Amihud (2002) illiquidity ratio. Size 1 is the group containing the smallest firms and Size 5 is the group containing the largest firms. Illiq 1 is the group containing the most liquid firms and Illiq 5 contains the most illiquid firms. Illiq (1-5) is the difference in the buy-sell ratio between the least illiquid firms and the most illiquid firms. * implies significance at 10% ** at a 5% level and *** at a 1% level.

All months								All months except December							
	Illiq 1	2	3	4	Illiq 5	Illiq(1-5)	t-value		Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.9170	0.9580	0.9874	1.0522	1.0410	-0.1241	(-9.84)***	Size 1	0.9283	0.9657	0.9927	1.0585	1.0475	-0.1192	(-9.06)***
2	0.9697	0.9750	0.9820	1.0137	1.0537	-0.0840	(-3.76)***	2	0.9608	0.9772	0.9813	1.0119	1.0542	-0.0935	(-5.20)***
3	0.9730	0.9906	0.9996	1.0142	1.0570	-0.0840	(-7.53)***	3	0.9754	0.9918	0.9973	1.0101	1.0517	-0.0763	(-6.63)***
4	0.9679	0.9825	0.9965	1.0108	1.0294	-0.0615	(-8.90)***	4	0.9689	0.9801	0.9923	1.0063	1.0247	-0.0557	(-8.14)***
Size 5	0.9843	0.9840	0.9913	0.9939	1.0381	-0.0538	(-1.48)	Size 5	0.9813	0.9810	0.9883	0.9899	1.0360	-0.0546	(-1.38)
ALL	0.9624	0.9780	0.9914	1.0170	1.0438	-0.0814	(-7.15)***	ALL	0.9630	0.9792	0.9904	1.0153	1.0428	-0.0798	(-6.80)***
January								December							
	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value		Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.9980	1.0405	1.0439	1.0671	1.0722	-0.0742	(-2.40)**	Size 1	0.7922	0.8725	0.9296	0.9829	0.9698	-0.1776	(-3.92)***
2	0.9825	0.9913	0.9894	0.9964	1.0013	-0.0188	(-0.96)	2	0.9068	0.9516	0.9900	1.0333	1.0479	-0.1411	(-3.11)***
3	0.9718	0.9924	0.9890	0.9744	1.0310	-0.0592	(-2.07)**	3	0.9458	0.9779	1.0247	1.0587	1.1153	-0.1695	(-3.79)***
4	0.9864	0.9674	0.9920	0.9977	0.9954	-0.0089	(-0.31)	4	0.9567	1.0091	1.0423	1.0603	1.0812	-0.1245	(-3.52)***
Size 5	0.9529	0.9610	0.9671	0.9775	1.0057	-0.0527	(-2.00) **	Size 5	1.0172	1.0169	1.0250	1.0382	1.0615	-0.0443	(-1.60)
ALL	0.9784	0.9905	0.9963	1.0026	1.0211	0.0427	(-2.70)***	ALL	0.9560	0.9657	1.0024	1.0347	1.0551	-0.0991	(-2.17)**

Table 2(ii): Average Buy-Sell Ratios- Retail Order Flow

In this table we report the mean buy-sell ratio for all CRSP/ISSM-TAQ listed securities . The buy- sell ratio is based on the average number of buyer initiated trades in a month scaled by shares outstanding to the average number of seller initiated trades per month scaled by shares outstanding associated with retail order flow. Buyer and seller initiated trades are identified by using the Lee and Ready (1993) algorithm. January and December panels provide buy-sell ratios for January and December separately. "All months" is the average across all months and All months except December uses all months but not December to calculate the average buy-sell ratio. Groups are first sorted on the basis of size then sorted on the basis of the Amihud (2002) illiquidity ratio. Size 1 is the group containing the smallest firms and Size 5 is the group containing the largest firms. Illiq 1 is the group containing the most liquid firms and Illiq 5 contains the most illiquid firms. Illiq (1-5) is the difference in the buy-sell ratio between the least illiquid firms and the most illiquid firms. * implies significance at 10% ** at a 5% level and *** at a 1% level.

All months								All months except December							
	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value		Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.7826	0.8092	0.8220	0.8358	0.8285	-0.0458	(-5.31)***	Size 1	0.7951	0.8176	0.8300	0.8441	0.8369	-0.0418	(-4.74)***
2	0.8461	0.8931	0.9202	0.9444	0.9605	-0.1144	(-8.06)***	2	0.8533	0.8954	0.9211	0.9440	0.9619	-0.1086	(-7.59)***
3	0.8871	0.9313	0.9485	0.9822	1.0179	-0.1308	(-8.62)***	3	0.8922	0.9393	0.9450	0.9789	1.0130	-0.1208	(-8.43)***
4	0.8811	0.9399	0.9468	0.9899	1.0162	-0.1351	(-9.79)***	4	0.8829	0.9300	0.9446	0.9873	1.0112	-0.1283	(-9.41)***
Size 5	0.8602	08973	0.9132	0.9404	0.9702	-0.1101	(-10.83)***	Size 5	0.8630	0.8977	0.9114	0.9387	0.9693	-0.1063	(-10.29)***
ALL	0.8514	0.8942	0.9101	0.9385	0.9587	-0.1072	(-9.76)***	ALL	0.8573	0.8960	0.9104	0.9386	0.9585	-0.1012	(-9.40)***
January								December							
	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value		Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.8732	0.8947	0.8666	0.8980	0.8434	0.0298	(1.27)	Size 1	0.6455	0.7176	0.7337	0.7444	0.7358	-0.0904	(-2.40)**
2	0.8798	0.8997	0.9285	0.9523	0.9419	-0.0621	(-1.86)*	2	0.7667	0.8683	0.9104	0.9480	0.9448	-0.1781	(-2.62)***
3	0.9063	0.9449	0.9378	0.9686	1.0176	-0.1113	(-2.39)**	3	0.8317	0.9458	0.9868	1.0179	1.0719	-0.2402	(-2.54)**
4	0.9049	0.9594	0.9626	0.9890	1.0162	-0.1113	(-2.73)***	4	0.8611	0.9453	0.9710	1.0190	1.0714	-0.2103	(-2.88)***
Size 5	0.8786	0.8988	0.9209	0.9496	0.9750	-0.0964	(-3.24)***	Size 5	0.8290	0.8927	0.9329	0.9591	0.9802	-0.1512	(-3.28)***
ALL	0.8885	0.9195	0.9233	0.9515	0.9588	-0.0702	(-2.56)**	ALL	0.7868	0.8740	0.9068	0.9378	0.9608	-0.1740	(-2.89)**

Table 2(iii): Average Buy-Sell Ratios – Institutional Order Flow

In this table we report the mean buy-sell ratio for all trades in CRSP/ISSM-TAQ listed securities. The buy- sell ratio is based on the average number of buyer initiated trades in a month scaled by shares outstanding to the average number of seller initiated trades per month scaled by shares outstanding associated with institutional order flow. Buyer and seller initiated trades are identified by using the Lee and Ready (1993) algorithm. January and December panels provide buy-sell ratios for January and December separately. "All months" is the average across all months and All months except December uses all months but not December to calculate the average buy-sell ratio. Groups are first sorted on the basis of size then sorted on the basis of the Amihud (2002) illiquidity ratio. Size 1 is the group containing the smallest firms and Size 5 is the group containing the largest firms. Illiq 1 is the group containing the most liquid firms and Illiq 5 contains the most illiquid firms. Illiq (1-5) is the difference in the buy-sell ratio between the least illiquid firms and the most illiquid firms. * implies significance at 10% ** at a 5% level and *** at a 1% level.

All months

	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.8708	0.8642	0.8504	0.8389	0.8358	0.0350	(4.00)***
2	0.8801	0.8680	0.8577	0.8440	0.8343	0.0458	(5.31)***
3	0.8827	0.8818	0.8715	0.8717	0.8601	0.0226	(3.52)***
4	0.8812	0.8710	0.8683	0.8620	0.8600	0.0213	(3.59)***
Size 5	0.8237	0.8363	0.8449	0.8449	0.8530	-0.0292	(-5.20)***
ALL	0.8677	0.8643	0.8586	0.8523	0.8486	0.0191	(4.63)***

All months except December

	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.8713	0.8674	0.8546	0.8403	0.8379	0.0334	(3.71)***
2	0.8832	0.8702	0.8616	0.8451	0.8362	0.0470	(5.12)***
3	0.8845	0.8837	0.8736	0.8753	0.8632	0.0214	(3.17)***
4	0.8843	0.8724	0.8711	0.8640	0.8627	0.0216	(3.50)***
Size 5	0.8260	0.8378	0.8467	0.8459	0.8543	-0.0283	(-4.93)***
ALL	0.8699	0.8663	0.8615	0.8541	0.8509	0.0190	(4.44)***

January

	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.8878	0.9098	0.9108	0.8864	0.8536	0.0341	(1.11)
2	0.9192	0.9071	0.8777	0.8671	0.8651	0.0541	(1.64)
3	0.9179	0.9143	0.8871	0.8928	0.8605	0.0574	(2.15)**
4	0.9298	0.9039	0.8983	0.8791	0.8855	0.0444	(1.90)*
Size 5	0.8380	0.8597	0.8827	0.8901	0.8875	-0.0495	(-2.03)**
ALL	0.8985	0.8990	0.8913	0.8831	0.8704	0.0281	(1.54)

December

	Illiq 1	2	3	4	Illiq 5	Illiq (1-5)	t-value
Size 1	0.8654	0.8289	0.8041	0.8241	0.8126	0.0528	(1.46)
2	0.8464	0.8446	0.8152	0.8320	0.8137	0.0328	(1.41)
3	0.8628	0.8609	0.8486	0.8320	0.8264	0.0364	(1.64)
4	0.8480	0.8552	0.8375	0.8399	0.8302	0.0178	(0.80)
Size 5	0.7988	0.8198	0.8261	0.8336	0.8388	-0.0399	(-1.59)
ALL	0.8443	0.8419	0.8263	0.8323	0.8243	0.0200	(1.27)

Table 3(i):Order Flow Imbalance Fixed Effects Panel Regression-Aggregate Order Flow

This table presents the results of a panel fixed effects regression in which three measures of the change in order flow imbalance are regressed against firm risk variables and a set of January dummy variables, one for each risk variable. The dependent variable is the change in the number of buyer initiated trades relative to all trades, the change in seller initiated trades relative to all trades, or the change in the buy-sell ratio of buyer initiated trades scaled by shares outstanding to seller initiated trades scaled by shares outstanding. The results in Panel A are for all firms. Panels B and C report the results for loser firms and winner firms respectively. * implies significance at 10% ** at a 5% level and *** at a 1% level.

														January dummy variable interacting with												
	Illiq	Brm	βrm^2	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Illiq	βrm	βrm^2	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Const.
All firms Panel A																											
Buy	0.000	-0.005	0.002	0.003	-0.001	0.007	0.001	0.002	0.001	0.000	0.000	0.000	0.002	-0.008	0.106	-0.037	-0.033	0.012	-0.012	-0.020	0.005	-0.007	0.070	-0.005	0.004	-0019	-0.006
	(0.57)	(-0.53)	(0.44)	(1.61)	(-0.41)	(0.67)	(0.87)	(0.85)	(4.25)***	(-0.08)	(0.17)	(-0.23)	(0.81)	(-6.43)***	(9.76)***	(-5.59)***	(-6.86)***	(1.50)	(-0.40)	(-5.83)***	(0.92)	(-15.27)***	(8.38)***	(-8.12)***	(6.69)***	(-1.99)**	(-1.10)
Sell	-0.000	0.005	-0.002	-0.003	0.001	-0.001	-0.002	-0.001	-0.001	-0.001	0.000	0.000	-0.003	0.009	-0.110	0.036	0.033	-0.009	-0.023	0.023	-0.10	0.007	-0.059	0.004	-0.004	0.022	0.004
	(-0.38)	(0.52)	(-0.35)	(-1.84)*	(0.49)	(-0.06)	(-1.40)	(-0.32)	(-2.57)**	(-0.35)	(-0.37)	(0.36)	(-0.91)	(6.89)***	(-10.02)***	(5.47)***	(6.74)***	(-1.07)	(-0.79)	(6.66)***	(-2.01)**	(15.16)***	(-7.02)***	(5.52)***	(5.53)***	(2.31)**	(0.68)
Buy-Sell	-0.001	0.002	-0.002	0.009	-0.001	0.014	0.005	0.005	0.004	0.013	0.000	0.000	0.009	-0.032	0.312	-0.109	-0.091	0.000	-0.049	-0.069	0.003	-0.019	0.254	-0.022	0.019	-0.096	-0.038
	(-0.63)	(0.03)	(-0.09)	(1.16)	(-0.12)	(0.29)	(0.79)	(0.57)	(3.92)***	(0.71)	(-0.32)	(0.09)	(0.67)	(5.81)***	(6.39)***	(-3.72)***	(-4.19)***	(0.01)	(-0.38)	(-4.47)***	(0.14)	(-8.95)***	(6.83)***	(-7.60)***	(6.44)***	(-2.26)**	(-1.61)
Loser firms Panel B																											
Buy	0.000	0.001	0.000	0.001	0.002	0.006	0.001	0.002	0.001	0.000	0.000	0.000		-0.004	0.043	-0.015	-0.019	0.007	0.012	-0.017	0.001	-0.002	0.047	0.000	0.002		-0.009
	(0.08)	(0.11)	(- 0.02)	(-0.56)	(0.49)	(0.44)	(0.46)	(0.77)	(2.45)***	(-0.07)	(-0.60)	(0.05)		(-2.91)***	(3.20)***	(-1.95)*	(-3.19)***	(0.77)	(0.34)	(-4.19)***	(0.22)	(-4.22)***	(4.46)***	(-0.26)	(2.81)***		(- 1.33)
Sell	0.000	0.000	0.000	-0.002	0.000	0.003	-0.002	0.000	0.000	-0.001	0.000	0.000		0.004	-0.046	0.012	0.020	-0.006	-0.064	0.021	-0.10	0.003	-0.032	-0.001	-0.001		0.005
	(0.22)	(0.02)	(0.03)	(-0.99)	(-0.12)	(0.24)	(-1.17)	(-0.19)	(-1.11)	(- 0.23)	(0.21)	(0.14)		(3.31)***	(-3.43)***	(1.51)	(3.48)***	(-0.66)	(-1.85)*	(5.23)***	(-1.69)*	(4.60)***	(-2.98)*	(-1.47)	(-2.06)**		(0.79)
Buy-Sell	-0.002	0.025	-0.010	0.003	0.009	0.001	0.005	0.005	0.003	0.010	0.000	0.000		-0.017	0.059	-0.024	-0.025	-0.031	0.032	-0.052	-0.008	0.000	0.182	-0.005	0.011		-0.051
	(-0.75)	(0.42)	(-0.35)	(0.32)	(0.59)	(0.02)	(0.63)	(0.44)	(2.58)***	(0.41)	(-0.24)	(-0.09)		(-2.84)***	(0.96)	(-0.65)	(-0.93)	(-0.72)	(0.20)	(-2.79)***	(-0.29)	(-0.07)	(3.75)***	(-1.28)	(3.38)***		(-1.70)*
Winner firms Panel C																											
Buy	-0.001	-0.014	0.004	0.006	-0.008	-0.001	0.004	-0.001	0.001	0.000	0.002	-0.004		-0.011	0.134	-0.039	-0.043	0.030	0.001	-0.030	0.020	-0.011	0.006	-0.040	0.014		0.000
	(-0.70)	(-0.66)	(0.44)	(1.65)*	(-1.50)	(- 0.03)	(1.42)	(-0.36)	(2.81)***	(0.00)	(1.49)	(-0.70)		(-2.53)**	(6.73)***	(-3.24)***	(-4.96)***	(2.13)**	(0.01)	(-4.61)***	(2.18)**	(12.55)***	(0.41)	(-9.13)***	(0.97)		(-0.01)
Sell	0.001	0.013	-0.004	-0.005	0.006	-0.002	-0.004	0.001	-0.001	-0.003	-0.003	0.004		0.013	-0.148	0.048	0.040	-0.022	-0.002	0.030	-0.018	0.011	-0.014	0.035	-0.010		-0.001
	(0.67)	(-0.61)	(-0.41)	(-1.39)	(1.11)	(-0.09)	(-1.30)	(0.34)	(-1.74)*	(-0.38)	(-1.83)*	(0.61)		(2.93)***	(-7.34)***	(3.96)***	(4.58)***	(1.50)	(-0.03)	(4.60)***	(-1.94)*	(12.55)***	(-0.88)*	(7.91)***	(-0.68)		(-0.11)
Buy-Sell	-0.013	-0.055	0.017	0.024	-0.028	0.019	0.014	-0.004	0.005	0.005	0.005	-0.025		-0.044	0.460	-0.136	-0.153	0.094	0.018	-0.115	0.057	-0.036	0.028	-0.140	0.038		-0.003
	(-1.39)	(-0.60)	(0.39)	(1.56)	(-1.18)	(0.19)	(1.12)	(-0.23)	(2.51)**	(0.16)	(0.77)	(-0.98)		(-2.36)**	(5.34)***	(-2.61)***	(-4.07)***	(1.52)	(0.08)	(-4.12)***	(1.44)	(-9.53)***	(0.42)	(-7.43)***	(0.61)		(-0.07)

Table 3(ii): Order Flow Imbalance Fixed Effects Panel Regression Results- Retail Order Flow

This table presents the results of a panel fixed effects regression in which three measures of the change in order flow imbalance are regressed against firm risk variables and a set of January dummy variables, one for each risk variable. The dependent variable is the change in the number of buyer initiated trades relative to all trades, the change in seller initiated trades relative to all trades, or the change in the buy-sell ratio of buyer initiated trades scaled by shares outstanding to seller initiated trades scaled by shares outstanding. The results in Panel A are for all firms. Panels B and C report the results for loser firms and winner firms respectively. * implies significance at 10% ** at a 5% level and *** at a 1% level.

														January dummy variable interacting with												
	Illiq	βrm	$βrm^2$	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Illiq	Brm	$βrm^2$	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Const.
All firms Panel A																											
Buy	-0.001	-0.018	0.007	0.005	0.001	0.020	0.001	0.002	0.001	0.011	-0.001	0.000	0.005	-0.013	0.195	-0.065	-0.064	0.014	0.001	-0.028	0.004	-0.013	0.044	-0.004	0.006	-0.052	-0.006
	(-0.79)	(-1.15)	(0.92)	(1.90)*	(0.36)	(1.20)	(0.57)	(0.92)	(4.48)***	(2.02)**	(-1.85)*	(0.03)	(1.07)	(-6.93)***	(11.83)***	(-6.69)***	(-9.18)***	(1.22)	(0.02)	(-5.70)***	(0.57)	(-17.14)***	(3.91)***	(-4.26)***	(6.71)***	(-3.64)***	(-0.82)
Sell	0.001	0.018	-0.007	-0.005	-0.001	-0.020	-0.001	-0.002	-0.001	-0.011	0.001	0.00	-0.005	0.013	-0.195	0.065	0.064	-0.014	-0.001	0.028	-0.004	0.013	-0.044	0.004	-0.006	0.052	0.006
	(0.79)	(1.15)	(-0.92)	(-1.90)*	(-0.36)	(-1.20)	(-0.57)	(-0.92)	(-4.48)***	(-2.02)*	(1.85)*	(-0.03)	(-1.07)	(6.93)***	(-11.83)***	(6.69)***	(-9.18)***	(-1.22)	(-0.02)	(5.70)***	(-0.57)	(-17.14)***	(-3.91)***	(4.26)***	(-6.71)***	(3.64)***	(0.82)
Buy-Sell	-0.008	-0.046	0.018	0.016	0.011	0.084	0.002	0.013	0.006	0.072	-0.004	0.001	0.020	-0.048	0.723	-0.235	-0.245	0.032	-0.065	-0.106	0.002	-0.046	0.122	-0.009	0.023	-0.269	-0.047
	(-1.75)*	(-0.63)	(0.51)	(1.29)	(0.57)	(1.07)	(0.24)	(1.02)	(4.01)***	(2.67)***	(-2.63)***	(0.83)	(0.89)	(-5.14)***	(9.05)***	(-5.01)***	(-7.22)***	(0.58)	(-0.31)	(-4.50)***	(0.05)	(12.90)***	(2.22)**	(-2.01)**	(5.35)***	(-3.86)***	(-1.26)
Loser firms Panel B																											
Buy	-0.001	-0.008	0.003	0.004	0.003	0.008	0.002	0.001	0.001	0.012	0.000	0.000		-0.008	0.069	-0.014	-0.047	0.026	0.084	-0.029	0.008	-0.005	0.014	0.002	0.003		-0.012
	(-0.73)	(-0.40)	(0.31)	(1.13)	(0.61)	(0.39)	(0.85)	(0.30)	(2.85)***	(1.74)*	(-1.38)	(-0.18)		(-3.97)***	(3.17)***	(-1.10)	(-5.18)***	(1.80)*	(1.57)	(-4.85)***	(0.86)	(-4.64)***	(0.97)	(1.47)	(3.44)***		(-1.15)
Sell	0.001	0.008	-0.003	-0.004	-0.003	-0.008	-0.002	-0.001	-0.001	-0.012	0.000	0.000		0.008	-0.069	0.014	0.047	-0.026	-0.084	0.029	-0.008	0.005	-0.014	-0.002	-0.003		0.012
	(0.73)	(0.40)	(-0.31)	(-1.13)	(-0.61)	(-0.39)	(-0.85)	(-0.30)	(-2.85)***	(-1.74)	(1.38)	(0.18)		(3.97)***	(-3.17)***	(1.10)	(5.18)***	(-1.80)*	(-1.57)	(4.85)***	(-0.86)	(4.64)***	(-0.97)	(-1.47)	(-3.44)***		(1.15)
Buy-Sell	-0.007	-0.018	0.009	0.013	0.023	0.034	0.007	0.008	0.007	0.083	-0.002	0.000		-0.032	0.316	-0.070	-0.192	0.064	0.026	-0.113	0.012	-0.019	0.003	0.008	0.015		-0.081
	(-1.24)	(-0.18)	(0.17)	(0.75)	(0.86)	(0.32)	(0.56)	(0.45)	(3.15)***	(2.18)**	(-1.25)	(0.21)		(-3.08)***	(2.87)***	(-1.11)	(-4.23)***	(0.88)	(0.97)	(-3.77)***	(0.26)	(-3.71)***	(0.04)	(1.51)	(3.18)***		(-1.56)
Winner firms Panel C																											
Buy	-0.002	-0.037	0.015	0.006	-0.002	0.028	0.002	0.002	0.002	0.005	0.002	0.000		-0.007	0.239	-0.081	-0.067	0.012	-0.056	-0.033	0.012	-0.016	-0.001	-0.041	0.013		0.006
	(-0.55)	(-1.29)	(1.08)	(1.28)	(-0.29)	(0.91)	(0.64)	(0.33)	(2.45)**	(0.46)	(0.76)	(-0.03)		(-1.13)	(8.71)***	(-4.97)***	(-5.80)***	(0.66)	(-0.76)	(-3.88)***	(1.00)	(-13.52)***	(-0.07)	(-7.31)***	(0.64)		(0.42)
Sell	0.002	0.037	-0.015	-0.006	0.002	-0.028	-0.002	-0.002	-0.002	-0.005	-0.002	0.000		0.007	-0.239	0.081	0.067	-0.012	0.056	0.033	-0.012	0.016	0.001	0.04	-0.013		-0.006
	(0.55)	(1.29)	(-1.08)	(-1.28)	(0.29))	(-0.91)	(-0.64)	(-0.33)	(-2.45)**	(-0.46)	(-0.76)	(0.03)		(1.13)	(-8.71)***	(4.97)***	(5.80)***	(-0.66)	(0.76)	(3.88)***	(-1.00)	(13.52)***	(0.07)	(7.31)***	(-0.64)		(-0.42)
Buy-Sell	-0.010	-0.120	0.045	0.024	-0.007	0.130	0.007	0.009	0.006	0.026	0.000	0.008		-0.014	0.861	-0.282	-0.251	0.042	-0.260	-0.122	0.034	-0.060	0.023	-0.126	0.001		0.011
	(-0.64)	(-0.91)	(0.72)	(1.06)	(-0.20)	(0.91)	(0.37)	(0.40)	(2.10)**	(0.56)	(0.04)	(0.19)		(-0.46)	(6.86)***	(-3.82)***	(-4.77)***	(0.48)	(-0.77)	(-3.17)***	(0.62)	(-10.92)***	(0.26)	(-4.95)***	(0.01)		(0.17)

Table 3(iii): Order Flow Imbalance Fixed Effects Panel Regression Results – Institutional Trades

This table presents the results of a panel fixed effects regression in which three measures of the change in order flow imbalance are regressed against firm risk variables and a set of January dummy variables, one for each risk variable. The dependent variable is the change in the number of buyer initiated trades relative to all trades, the change in seller initiated trades relative to all trades, or the change in the buy-sell ratio of buyer initiated trades scaled by shares outstanding to seller initiated trades scaled by shares outstanding. The results in Panel A are for all firms. Panels B and C report the results for loser firms and winner firms respectively. * implies significance at 10% ** at a 5% level and *** at a 1% level.

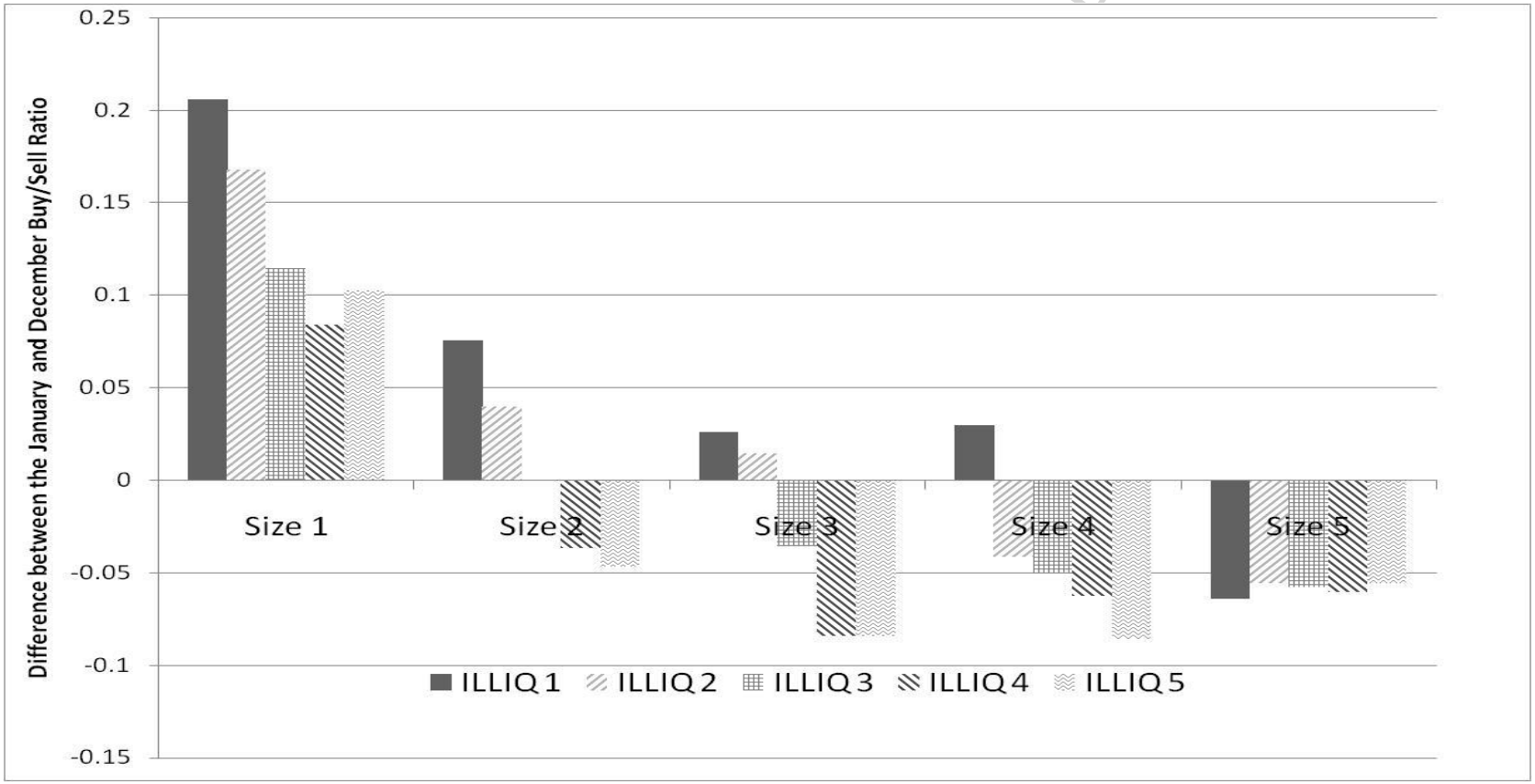
														January dummy variable interacting with													
	Illiq	βrm	$βrm^2$	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Illiq	Brm	$βrm^2$	βSMB	βHML	βPS	βRMW	βCMA	Size	Unsyst	CAPΔ	CAPΔ*Illiq	CAPΔ *loser*Illiq	Const.
All firms Panel A																											
Buy	0.008	0.015	-0.009	0.000	-0.006	-0.009	0.003	-0.004	0.000	0.009	0.000	-0.003	-0.005	-0.001	0.057	-0.023	-0.022	0.002	-0.095	0.011	-0.023	-0.003	-0.019	0.002	0.002	0.034	-0.008
	(0.99)	(0.50)	(-0.70)	(0.12)	(-0.88)	(-0.48)	(0.57)	(-0.88)	(0.59)	(1.08)	(1.14)	(-1.14)	(-0.21)	(-0.12)	(2.79)***	(-1.73)*	(-2.53)**	(0.12)	(-1.77)*	(1.17)	(-2.07)**	(-3.67)***	(-1.01)	(1.23)	(0.49)	(0.66)	(-0.45)
Sell	-0.008	-0.015	0.009	0.000	0.006	0.009	-0.003	0.004	0.000	-0.009	0.000	0.003	0.005	0.001	-0.057	0.023	0.022	-0.002	0.095	-0.011	0.023	0.003	0.019	-0.002	-0.002	-0.034	0.008
	(-0.99)	(-0.50)	(0.70)	(-0.12)	(0.88)	(0.48)	(-0.57)	(0.88)	(-0.59)	(-1.08)	(-1.14)	(1.14)	(0.21)	(0.12)	(-2.79)***	(1.73)	(2.53)**	(-0.12)	(1.77)*	(-1.17)	(2.07)**	(3.67)***	(1.01)	(-1.23)	(-0.49)	(-0.66)	(0.45)
Buy-Sell	0.036	0.045	-0.032	0.002	-0.036	-0.042	0.014	-0.020	0.002	0.040	0.002	-0.011	-0.040	-0.001	0.286	--0.129	-0.089	-0.025	-0.448	0.076	-0.122	-0.014	-0.082	0.011	0.006	0.225	-0.025
	(0.87)	(0.29)	(-0.49)	(0.09)	(-1.02)	(-0.43)	(0.61)	(-0.92)	(0.84)	(0.96)	(1.11)	(-0.98)	(-0.36)	(-0.02)	(2.80)***	(-1.92)*	(-2.00)**	(-0.31)	(-1.66)*	(1.69)*	(-2.21)**	(-3.50)***	(-0.86)	(1.57)	(0.33)	(0.88)	(-0.27)
Loser firms Panel B																											
Buy	0.004	-0.004	0.001	0.000	-0.004	-0.014	0.003	-0.003	0.000	0.009	0.001	-0.002		-0.001	0.065	-0.030	-0.018	-0.007	-0.087	0.012	-0.025	-0.003	0.011	-0.001	0.002		0.002
	(0.42)	(-0.11)	(0.05)	(-0.09)	(-0.44)	(-0.60)	(0.58)	(-0.60)	(-0.03)	(0.87)	(1.61)	(-0.83)		(-0.19)	(2.73)***	(-1.97)**	(-1.72)*	(-0.40)	(-1.39)	(1.23)	(-2.00)**	(-3.08)***	(0.47)	(-0.58)	(0.70)		(0.08)
Sell	-0.004	0.004	-0.001	0.000	0.004	0.014	-0.003	0.003	0.000	-0.009	-0.001	0.002		0.001	-0.065	0.030	0.018	0.007	0.087	-0.012	0.025	0.003	-0.011	0.001	-0.002		-0.002
	(-0.42)	(0.11)	(-0.05)	(0.09)	(0.44)	(0.60)	(-0.58)	(0.60)	(0.03)	(-0.87)	(-1.61)	(0.83)		(0.19)	(-2.73)***	(1.97)**	(1.72)*	(0.40)	(1.39)	(-1.23)	(2.00)**	(3.08)***	(-0.47)	(0.58)	(-0.70)		(-0.08)
Buy-Sell	0.004	-0.034	0.012	-0.006	-0.016	-0.054	0.010	-0.012	0.000	0.039	0.004	-0.006		-0.004	0.316	-0.158	-0.066	-0.071	-0.417	0.091	-0.143	-0.014	0.079	-0.004	0.010		0.014
	(0.09)	(-0.19)	(0.16)	(-0.27)	(-0.40)	(-0.47)	(0.39)	(-0.47)	(0.13)	(0.76)	(1.48)	(-0.48)		(-0.10)	(2.66)***	(-2.07)**	(-1.28)	(-0.79)	(-1.33)	(1.81)*	(-2.28)**	(-2.84)***	(0.67)	(-0.39)	(0.57)		(0.13)
Winner firms Panel C																											
Buy	0.063	0.079	-0.040	-0.003	-0.008	-0.005	0.000	-0.007	0.001	-0.009	-0.004	0.145		-0.037	0.056	-0.014	-0.043	0.027	-0.105	0.004	-0.020	-0.004	-0.033	0.024	-0.142		-0.044
	(1.20)	(0.78)	(-0.98)	(-0.30)	(-0.34)	(-0.10)	(0.01)	(-0.51)	(1.28)	(-0.50)	(-1.25)	(1.20)		(-1.00)	(1.37)	(-0.50)	(-2.38)**	(0.80)	(-0.98)	(0.21)	(-0.84)	(-2.52)**	(-0.84)	(2.79)***	(-0.80)		(-0.71)
Sell	-0.063	-0.079	0.040	-0.003	0.008	0.005	0.000	0.007	-0.001	0.009	0.004	-0.145		0.037	-0.056	-0.014	0.043	-0.027	0.105	-0.004	0.020	0.004	0.033	-0.024	0.142		0.044
	(-1.20)	(-0.78)	(0.98)	(-0.30)	(0.34)	(0.10)	(-0.01)	(0.51)	(-1.28)	(0.50)	(1.25)	(-1.20)		(1.00)	(-1.37)	(-0.50)	(2.38)**	(-0.80)	(0.98)	(-0.21)	(0.84)	(2.52)**	(0.84)	(-2.79)***	(0.80)		(0.71)
Buy-Sell	0.340	0.349	-0.176	-0.008	-0.055	-0.059	0.007	-0.032	0.006	-0.041	-0.021	0.758		-0.171	0.316	-0.102	-0.186	0.100	-0.455	0.030	-0.089	-0.019	-0.181	0.110	-0.608		-0.201
	(1.27)	(0.68)	(-0.85)	(-0.16)	(-0.49)	(-0.25)	(0.08)	(-0.48)	(1.38)	(-0.43)	(-1.28)	(1.23)		(-0.91)	(1.52)	(-0.71)	(-2.05)**	(0.58)	(-0.84)	(0.30)	(-0.75)	(-2.56)***	(-0.91)	(2.49)**	(-0.67)		(-0.64)

Table 4: Month by Month Cross-Section Results

Reported are the time series averages of coefficients from cross-section Fama-MacBeth regressions using monthly return data for NYSE/AMEX stocks over the period 1983-2008. The results for "All months" utilize each time series coefficient from the cross-section. "No January" utilizes each time series coefficient except those obtained from January. January to December are the time series coefficient averages obtained for each month. Reported are the coefficients from regressing against monthly returns the extended factor model that includes the Amihud (2002) illiquidity measure (Illiq), market beta (β_{rm}), market beta squared (β_{rm}^2), illiquidity, the estimated beta on the Fama-French SMB factor (β_{SMB}), and the estimated beta on the Fama-French HML factor (β_{HML}), the market wide illiquidity risk factor (β_{ps}), profitability (β_{RMW}) and investment betas(β_{CMA}) the logarithm of firm size (Size), the standard deviation of residual returns (Unsyst.), CAPΔ is the previous year's capital change, CAPΔ*Illiq and CAPΔ*loser*Illiq are the interaction variables with the capital change. * implies significance at 10% and ** at a 5% level and *** at a 1% level.

	Constant	Illiq	β_{rm}	β_{rm}^2	β_{SMB}	β_{HML}	β_{ps}	β_{RMW}	β_{CMA}	Size	Unsyst.	CAPΔ	CAPΔ*Illiq	CAPΔ*loser*Illiq
All months	0.005	0.000	0.037	-0.016	-0.009	0.001	-0.017	0.002	-0.005	-0.002	-0.011	0.002	0.000	-0.003
	(0.56)	(1.40)	(2.20)**	(-2.01)**	(-2.29)**	(0.30)	(-1.03)	(0.67)	(-2.11)**	(-2.37)**	(-0.78)	(1.72)*	(0.26)	(-1.49)
No January	0.010	0.001	0.013	-0.005	-0.004	0.000	-0.037	0.005	-0.005	-0.001	-0.041	0.004	-0.001	0.000
	(1.12)	(3.06)***	(0.79)	(-0.70)	(-1.08)	(0.06)	(-2.20)**	(1.82)*	(-1.97)**	(-0.89)	(-2.76)***	(3.90)***	(-0.95)	(-0.18)
January	-0.052	-0.005	0.301	-0.129	-0.062	0.012	0.208	-0.032	-0.006	-0.013	0.316	-0.025	0.009	-0.029
	(-2.14)**	(-2.09)**	(3.59)***	(-3.54)***	(-3.10)***	(1.01)	(2.47)**	(-2.97)***	(-0.85)	(-3.47)***	(3.84)***	(-2.82)***	(1.49)	(-2.15)**
February	-0.029	0.001	0.131	-0.051	-0.009	-0.007	-0.020	0.006	-0.002	-0.005	0.078	0.000	0.003	-0.005
	(-1.31)	(1.25)	(1.99)**	(-1.77)*	(-0.62)	(-0.56)	(-0.41)	(0.73)	(-0.35)	(-2.32)**	(1.17)	(0.12)	(0.80)	(-1.10)
March	0.050	0.000	-0.050	0.028	-0.007	0.001	-0.089	0.014	-0.001	-0.003	0.023	0.001	0.000	-0.008
	(1.86)*	(0.15)	(-0.79)	(0.89)	(-0.64)	(0.09)	(2.18)**	(2.13)**	(-0.12)	(-1.67)*	(0.89)	(0.72)	(-0.30)	(-1.61)
April	-0.002	0.001	0.034	-0.011	-0.014	0.016	-0.003	0.002	-0.006	-0.001	-0.051	0.001	-0.002	0.009
	(-0.07)	(1.89)*	(0.56)	(-0.35)	(-1.37)	(1.13)	(-0.06)	(0.23)	(-0.84)	(-0.51)	(-1.65)	(0.41)	(-1.42)	(2.56)***
May	-0.027	-0.001	0.120	-0.056	0.002	-0.021	-0.024	0.008	-0.015	0.000	0.011	-0.002	0.001	-0.006
	(-1.39)	(-1.34)	(2.74)***	(-2.67)***	(0.18)	(-1.57)	(-0.52)	(0.90)	(-1.49)	(-0.19)	(0.31)	(-0.53)	(1.01)	(-1.44)
June	0.048	-0.000	-0.029	0.004	0.001	-0.001	-0.079	0.014	-0.018	-0.003	-0.078	0.005	0.002	-0.004
	(2.02)**	(-0.40)	(-0.71)	(0.21)	(0.05)	(-0.11)	(-1.94)*	(2.48)**	(-3.09)***	(-2.49)**	(-2.12)**	(1.54)	(1.35)	(-1.03)
July	-0.010	0.001	0.024	-0.008	-0.026	0.044	0.172	-0.022	0.021	0.000	-0.111	0.004	0.002	-0.012
	(-0.35)	(1.14)	(0.48)	(-0.33)	(-2.64)***	(3.32)***	(3.14)***	(-3.17)***	(2.76)***	(-0.05)	(-3.04)***	(1.32)	(0.98)	(-2.10)**
August	0.031	0.002	-0.021	0.005	0.002	-0.021	-0.149	0.009	-0.016	0.000	-0.048	0.004	-0.005	0.008
	(1.35)	(1.83)*	(-0.50)	(0.24)	(0.16)	(-1.81)*	(-3.49)***	(1.43)	(-1.67)*	(0.16)	(-1.41)	(0.90)	(-1.33)	(1.12)
September	0.012	0.001	-0.035	0.006	-0.007	0.024	-0.061	-0.004	0.003	0.000	-0.004	0.005	0.000	-0.001
	(0.62)	(1.74)*	(-0.84)	(0.33)	(-0.93)	(2.03)**	(-1.27)	(-0.59)	(0.45)	(0.49)	(-0.10)	(1.94)*	(-0.22)	(-0.20)
October	-0.028	0.003	0.010	-0.010	0.010	-0.015	-0.034	-0.007	0.002	0.005	-0.080	0.010	-0.003	0.004
	(-1.11)	(2.25)**	(0.18)	(-0.43)	(0.72)	(-0.58)	(-0.71)	(-0.76)	(0.21)	(3.59)***	(-1.52)	(2.81)***	(-1.16)	(0.76)
November	0.030	0.001	0.001	0.010	-0.013	-0.009	-0.018	0.009	-0.014	-0.002	-0.071	0.008	-0.001	0.005
	(0.98)	(0.59)	(0.03)	(0.45)	(-1.14)	(-0.86)	(-0.26)	(1.21)	(-1.28)	(-1.02)	(-1.44)	(2.07)**	(-0.56)	(1.13)
December	0.032	0.001	-0.036	0.022	0.016	-0.008	-0.102	0.024	-0.012	0.001	-0.117	0.010	-0.003	0.006
	(1.32)	(1.76)*	(-0.77)	(0.93)	(1.39)	(-0.74)	(-1.94)*	(3.03)***	(-1.60)	(0.36)	(-1.82)*	(1.91)*	(-1.80)*	(1.06)

Figure 1: Changes in the buy-sell ratio between December and January-All Firms



This figure presents information about the average change in the buy/sell ratio between December and January. Firms are first sorted by size the divided into five groups based on illiquidity. Size 1 refers to the group of smallest firms in the sample while Size 5 refers to the group of largest firms in the sample. Illiq1 refers to the low illiquidity group based on the Amihud (2002) illiquidity ratio and Illiq5 refers to the high illiquidity group.

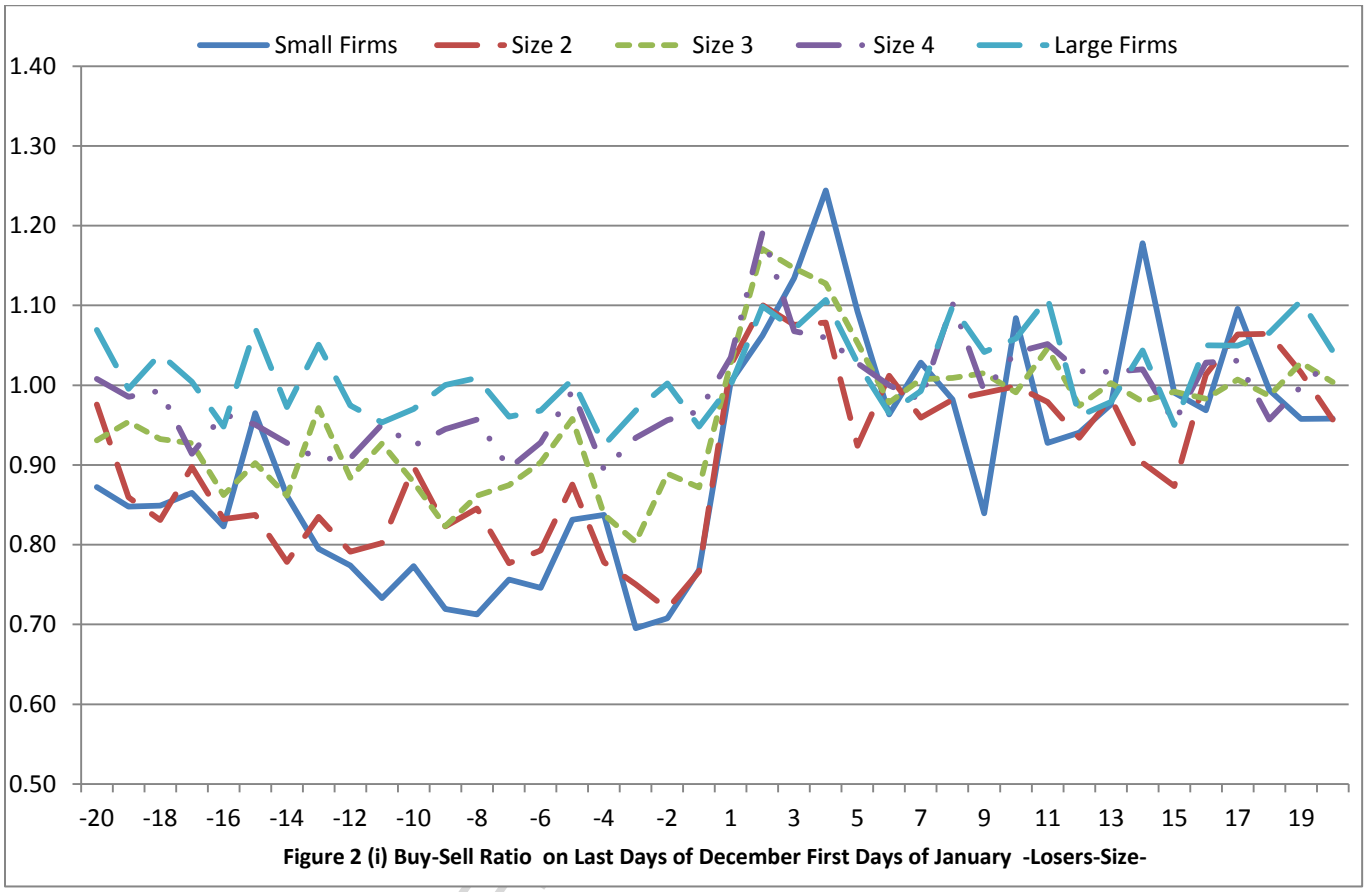


Figure 2 (i) Buy-Sell Ratio on Last Days of December First Days of January -Losers-Size-

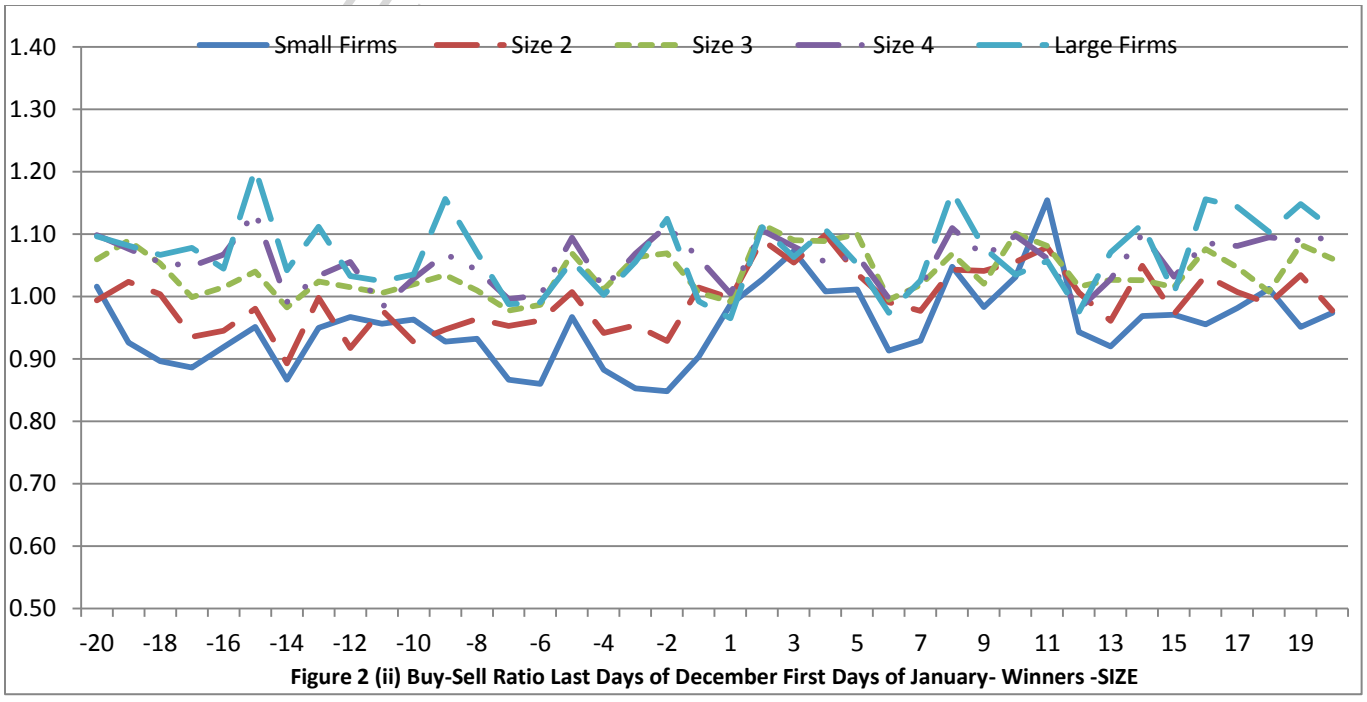


Figure 2 (ii) Buy-Sell Ratio Last Days of December First Days of January- Winners -SIZE

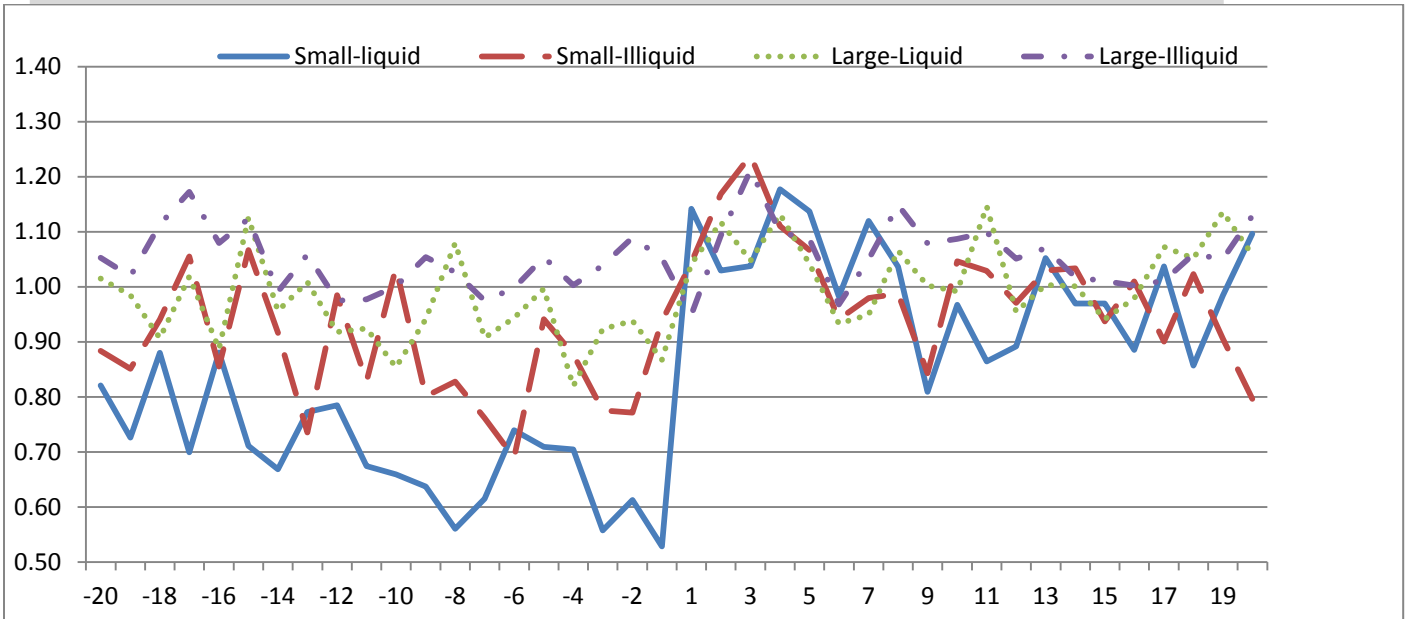


Figure 3, Panel A (i) Buy-Sell Ratio Last Days of December First Days of January-Losers -Iliquiidity-

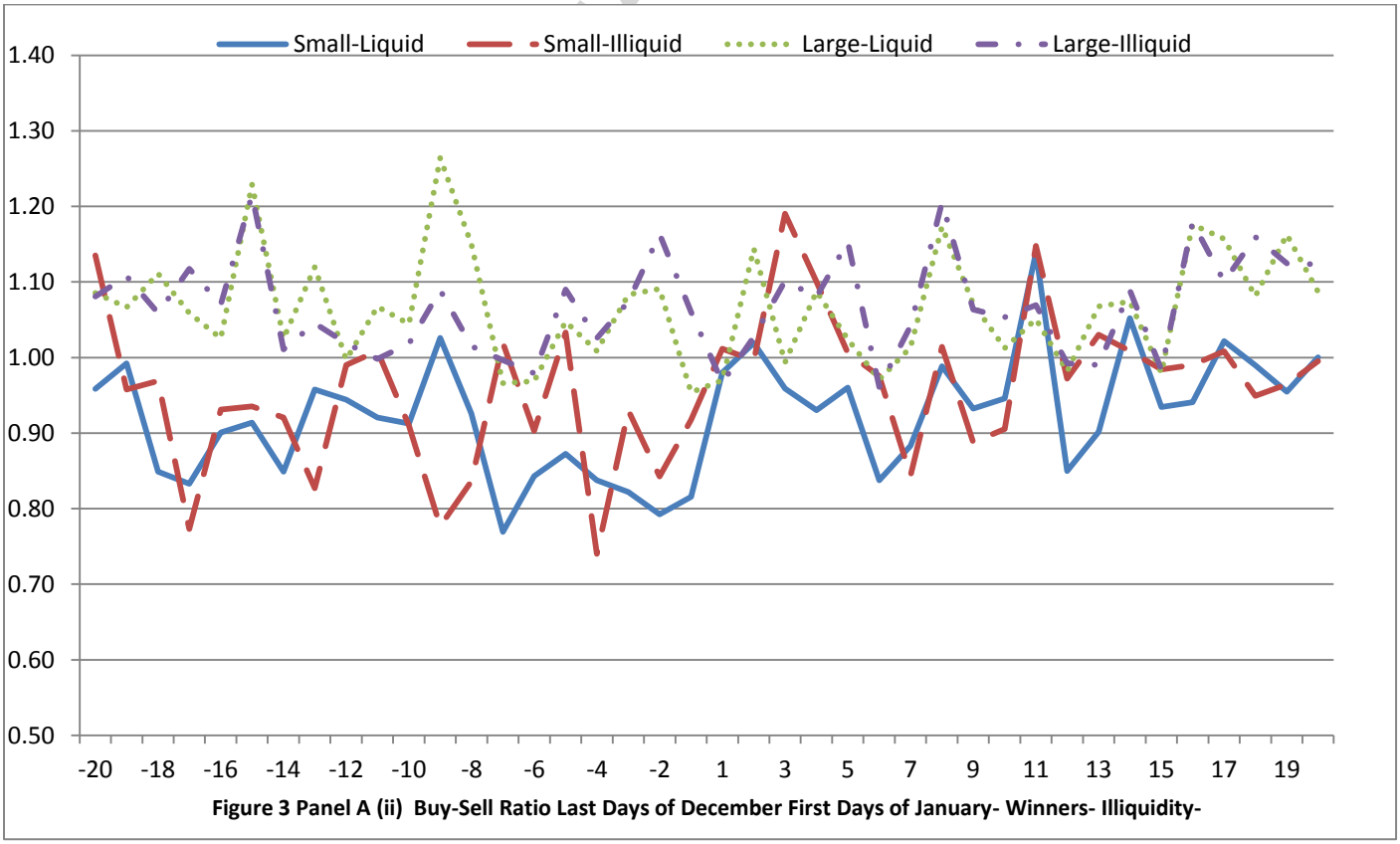


Figure 3 Panel A (ii) Buy-Sell Ratio Last Days of December First Days of January- Winners- Illiquidity-

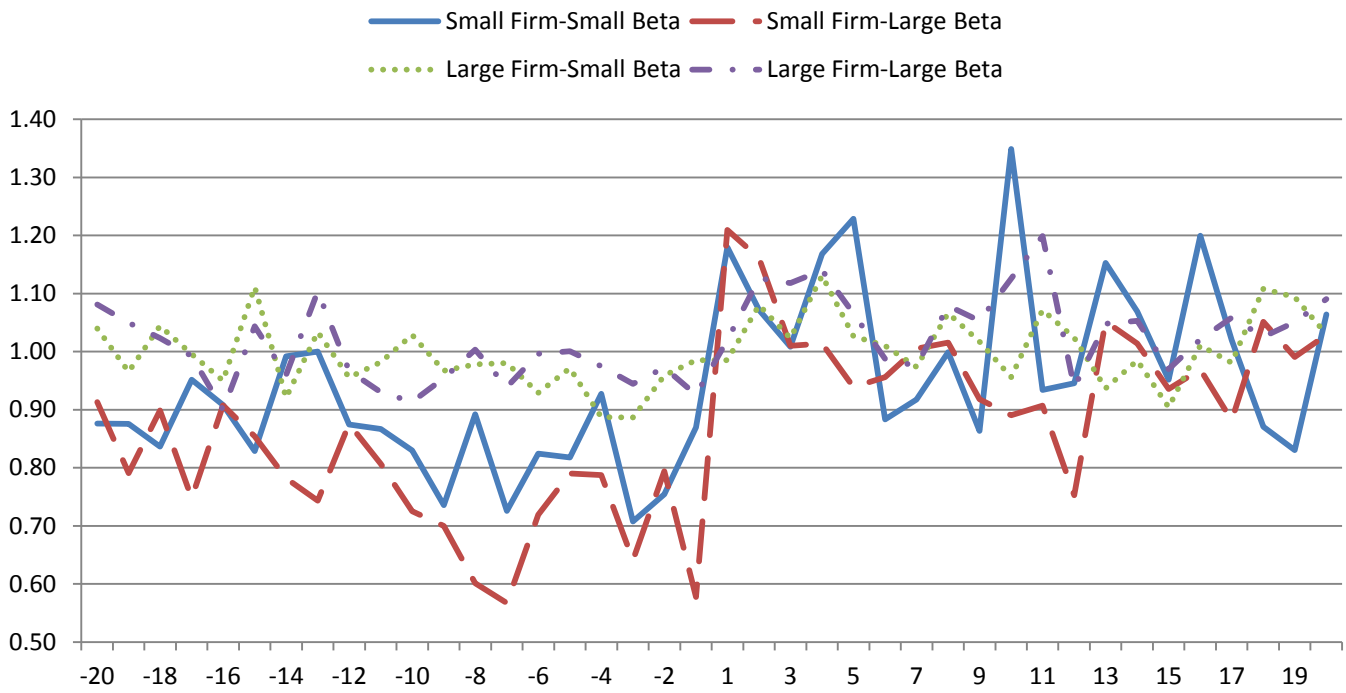


Figure 3 Panel B (i) Buy-Sell Ratio Last Days of December First Days of Janaury- Losers- Market Beta

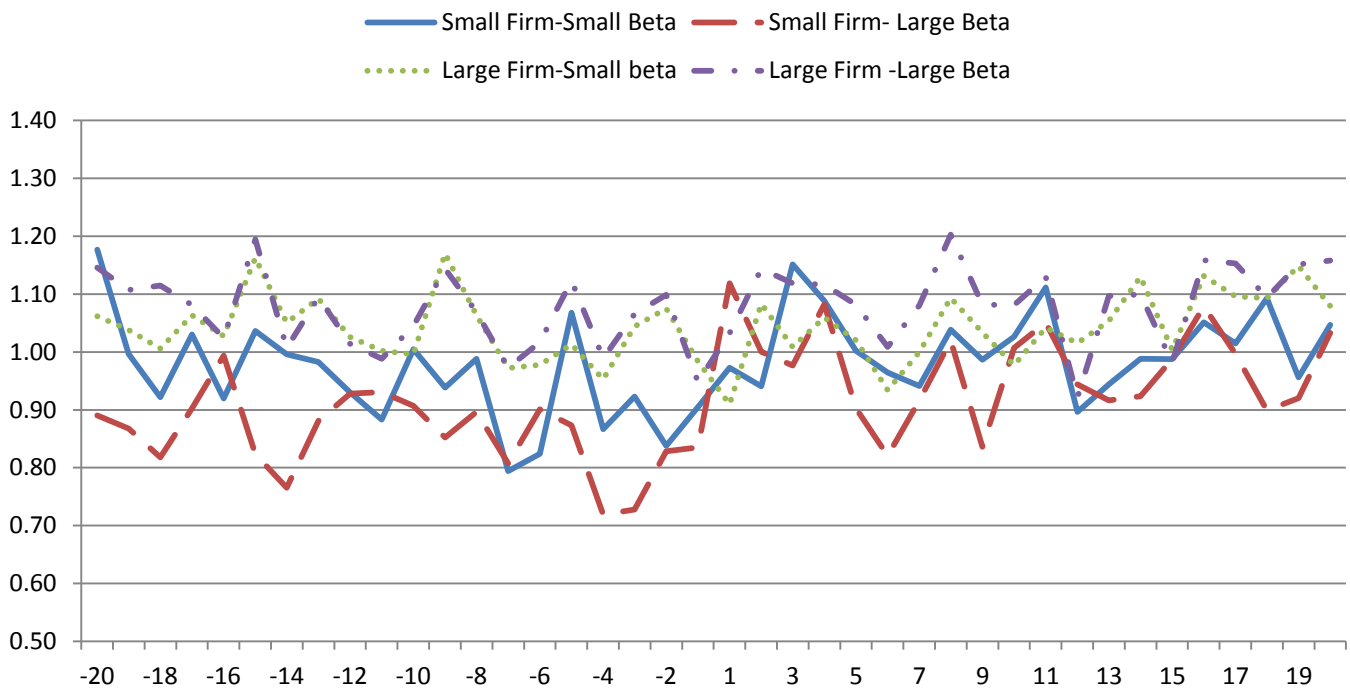


Figure 3 Panel B (ii) Buy-Sell Ratio Last Days of December First Days of January- Winners- Market Beta

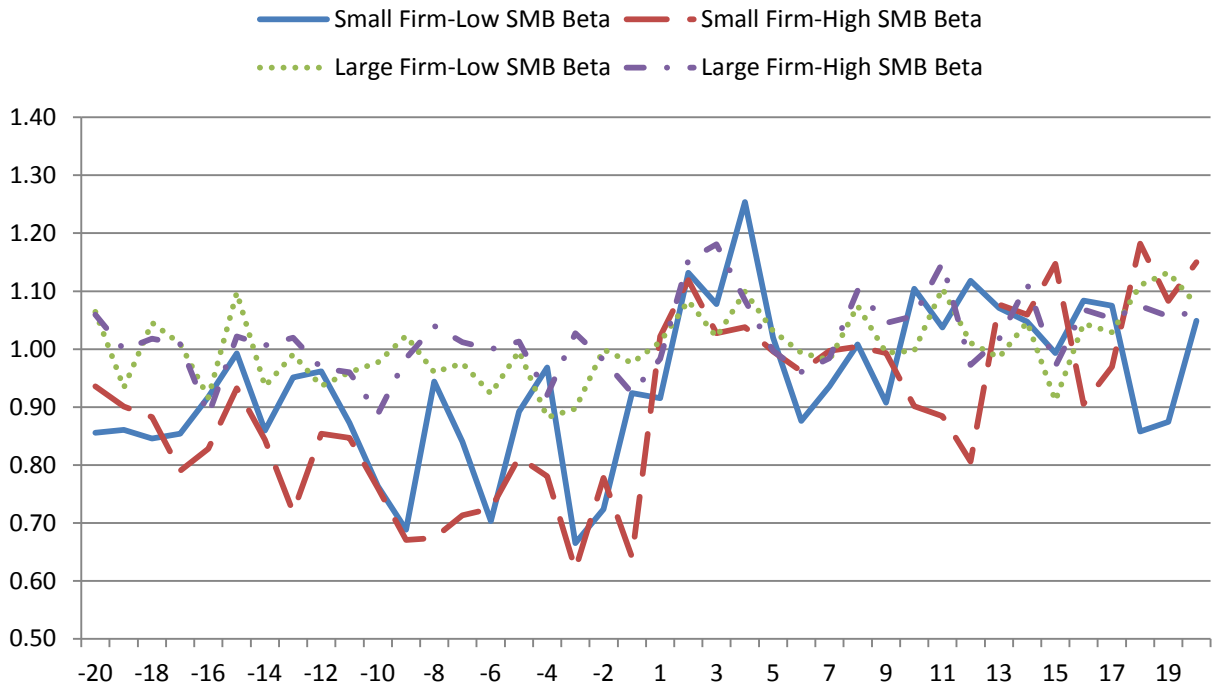


Figure 3 Panel C (i) Buy-Sell Ratio Last Days of December First Days of January-Losers- SMB

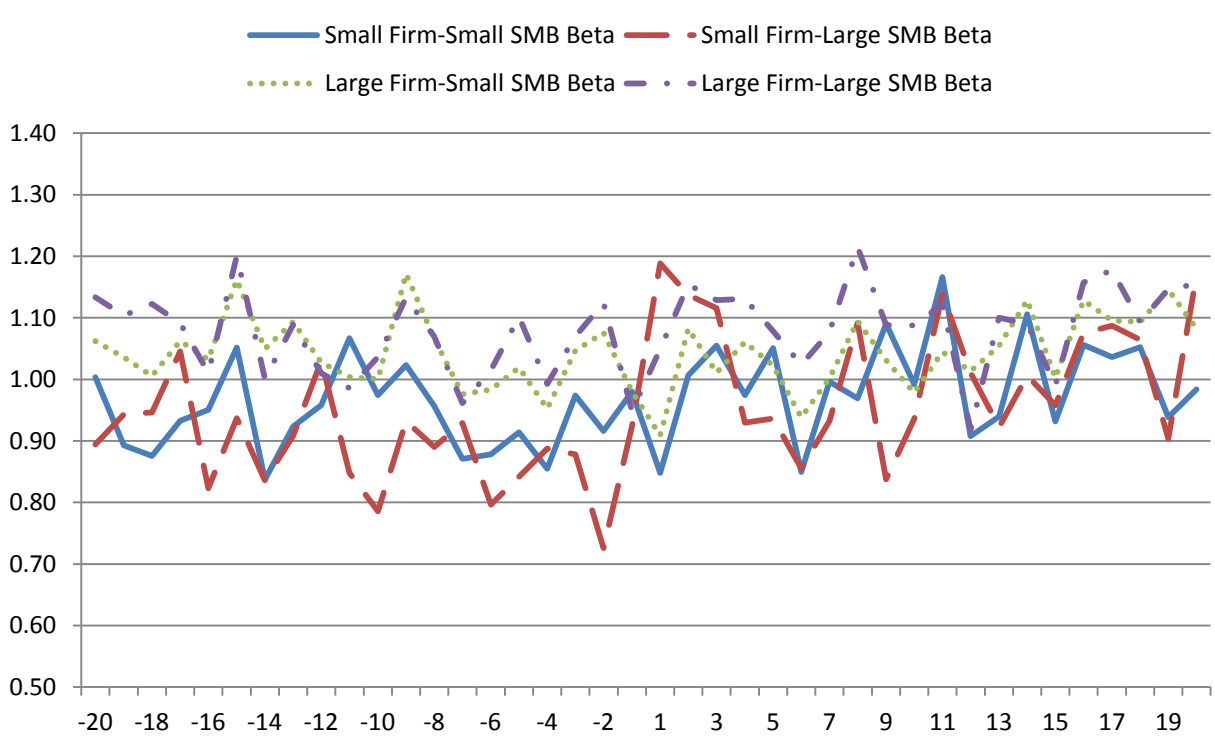


Figure 3 C(ii) Buy-Sell Ratio Last Days of December First Days of Janaury - Winners- SMB

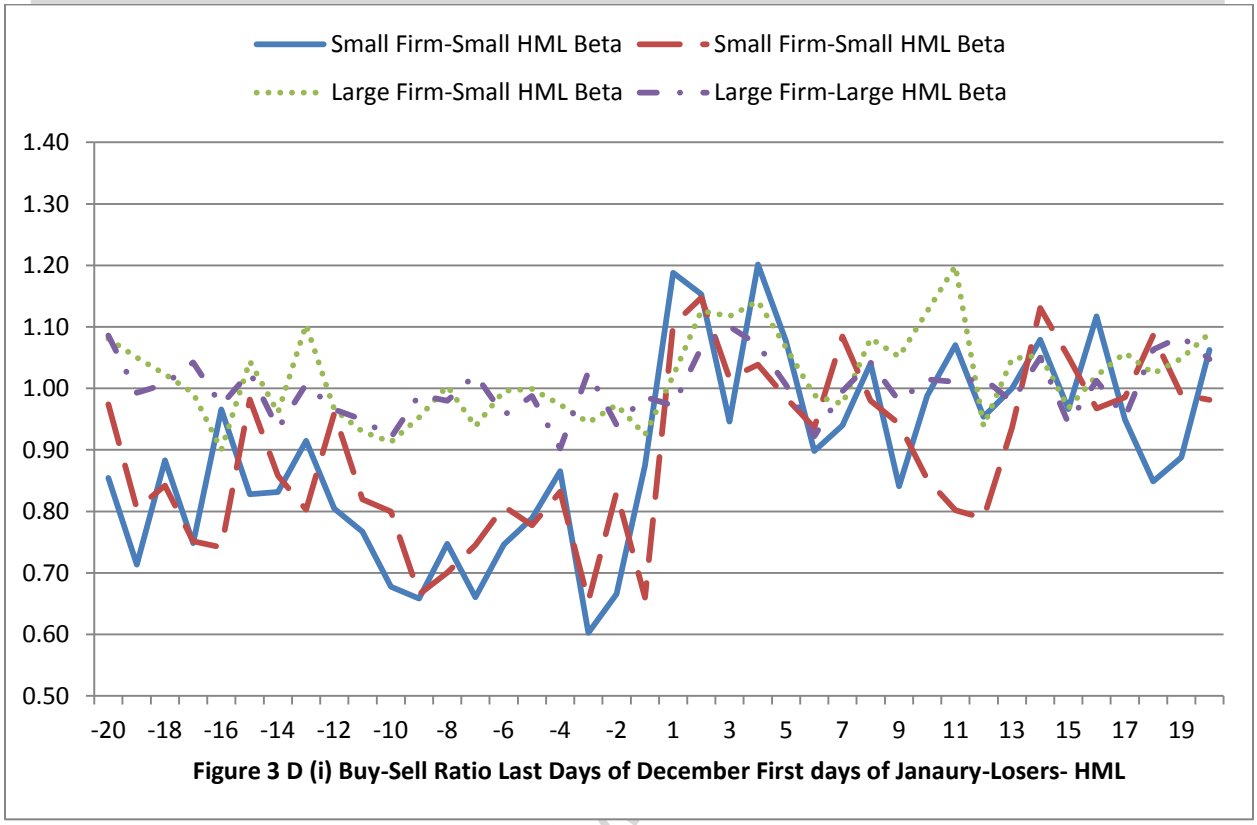


Figure 3 D (i) Buy-Sell Ratio Last Days of December First days of Janaury-Losers- HML

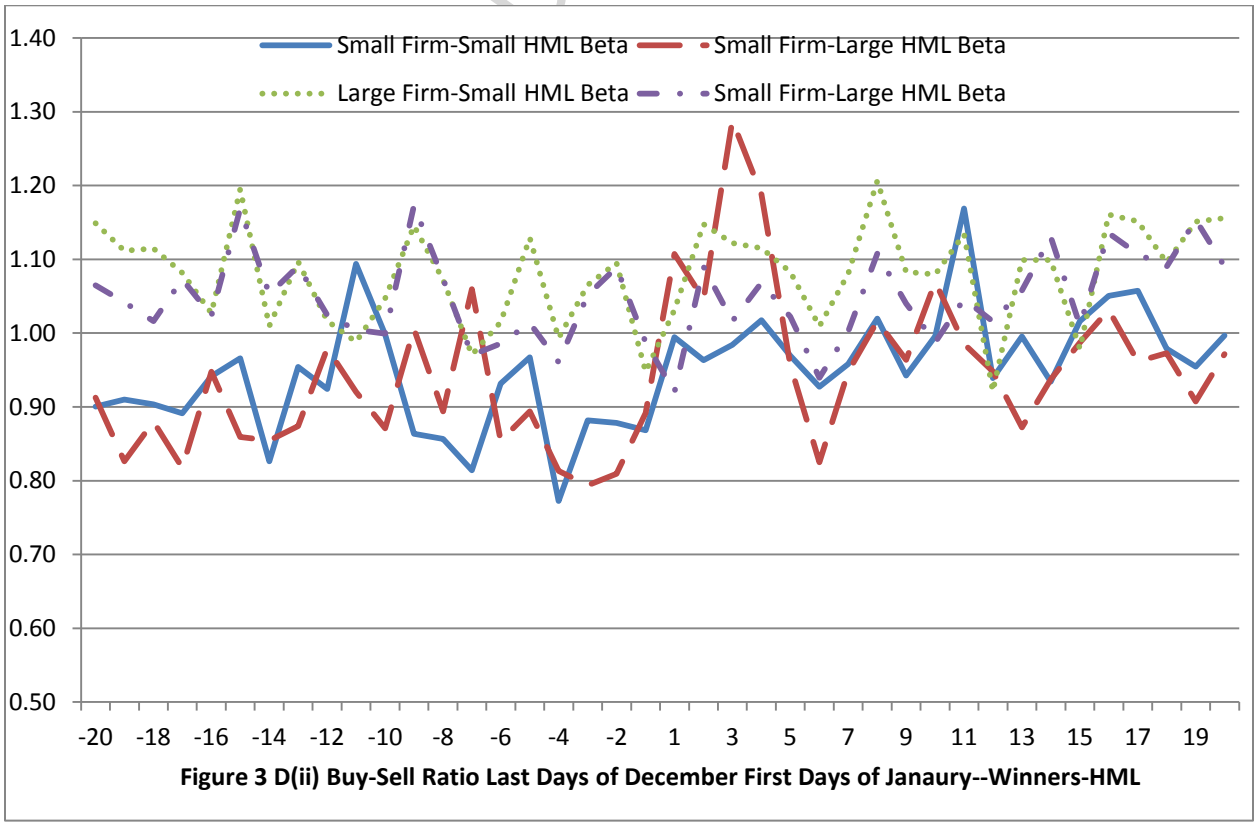


Figure 3 D(ii) Buy-Sell Ratio Last Days of December First Days of Janaury--Winners-HML

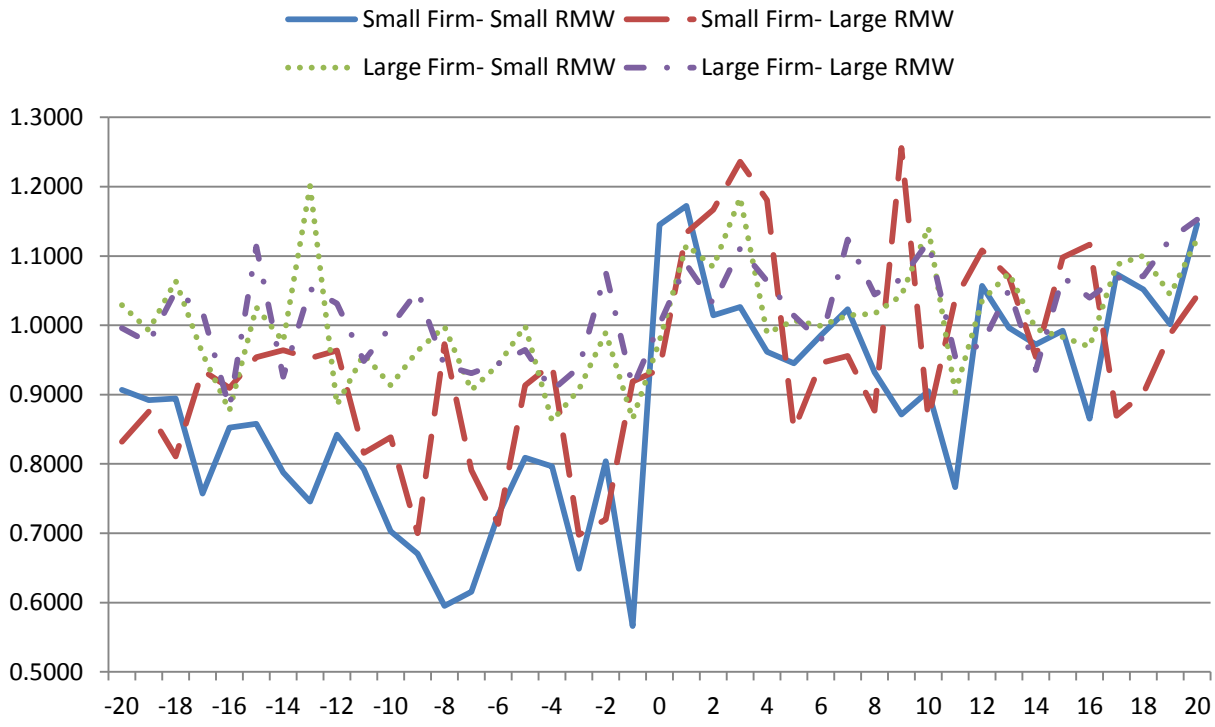


Figure 3 E (i) Buy-Sell Ratio Last Days of December First Days of January- Losers RMW

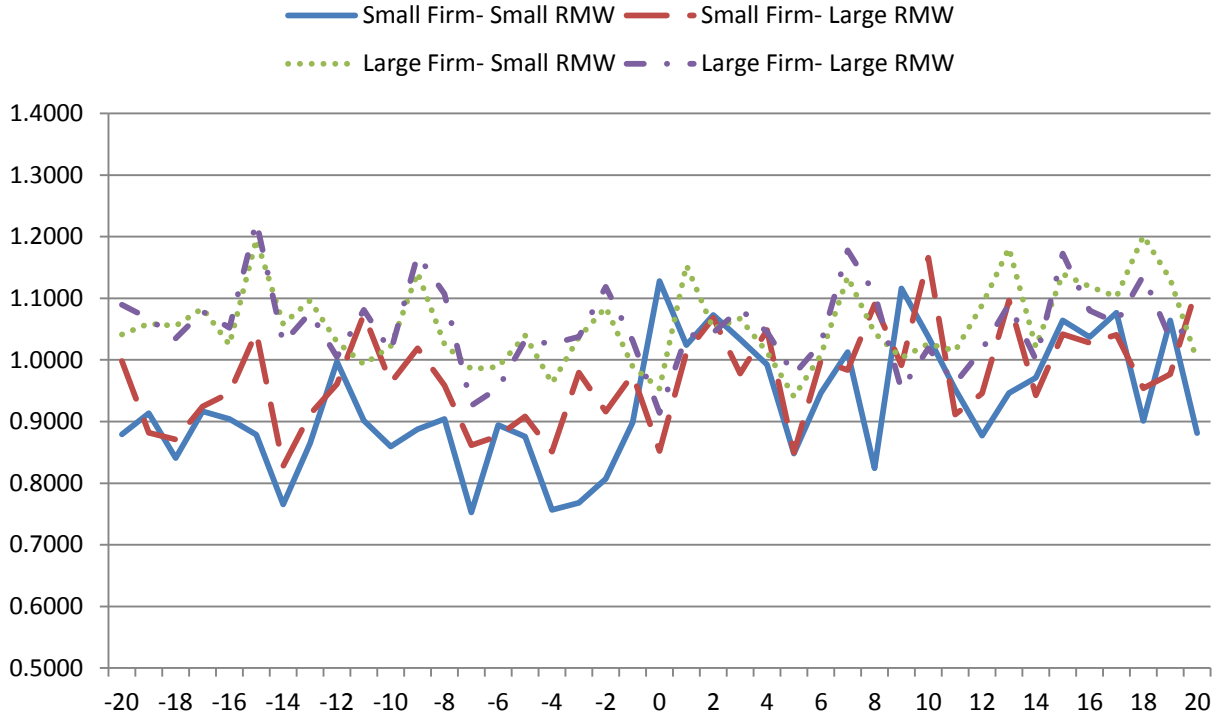


Figure 3 E(ii) Buy-Sell Ratio Last Days of December First Days of January- Winners-RMW

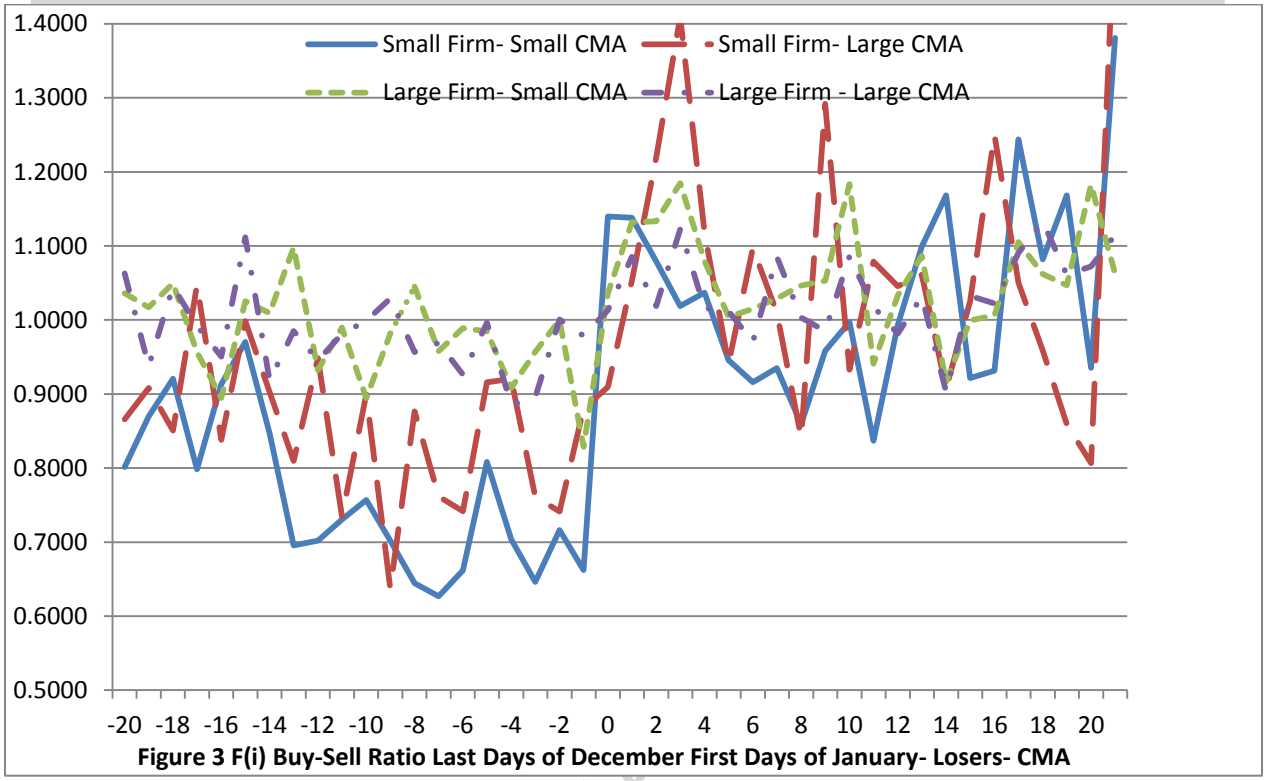


Figure 3 F(i) Buy-Sell Ratio Last Days of December First Days of January- Losers- CMA

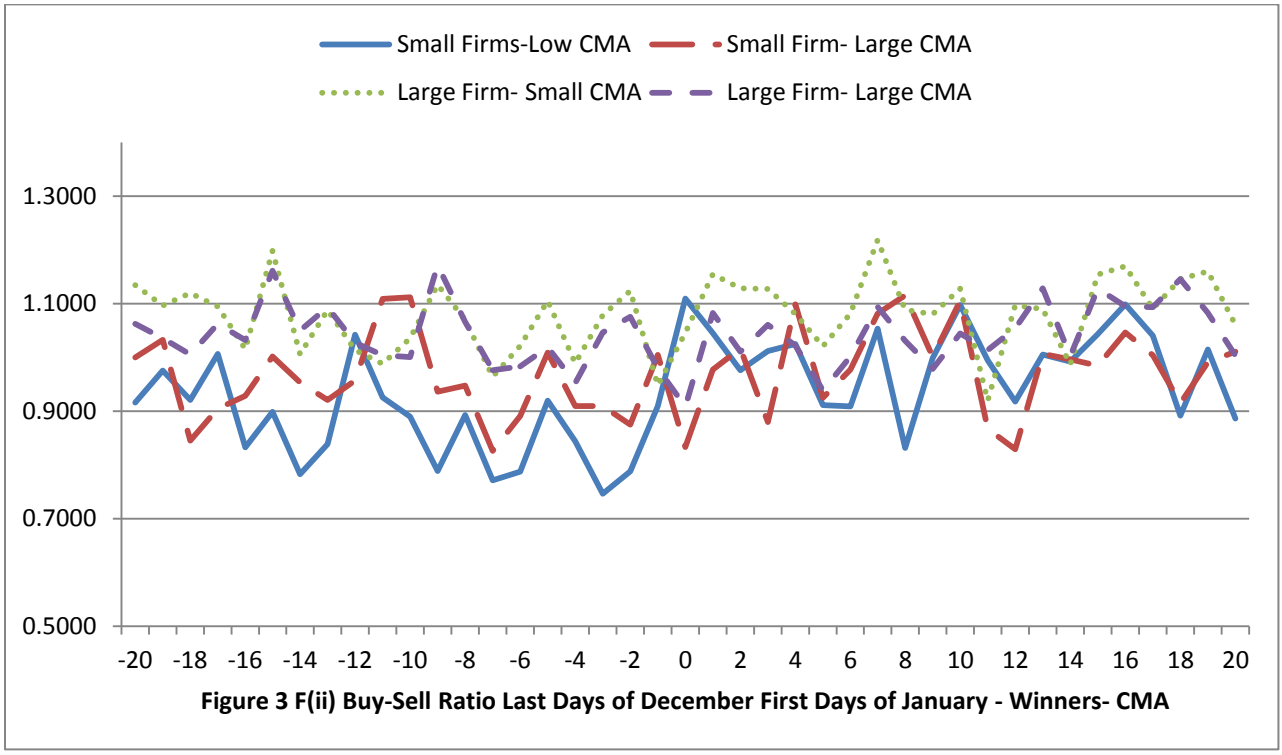


Figure 3 F(ii) Buy-Sell Ratio Last Days of December First Days of January - Winners- CMA

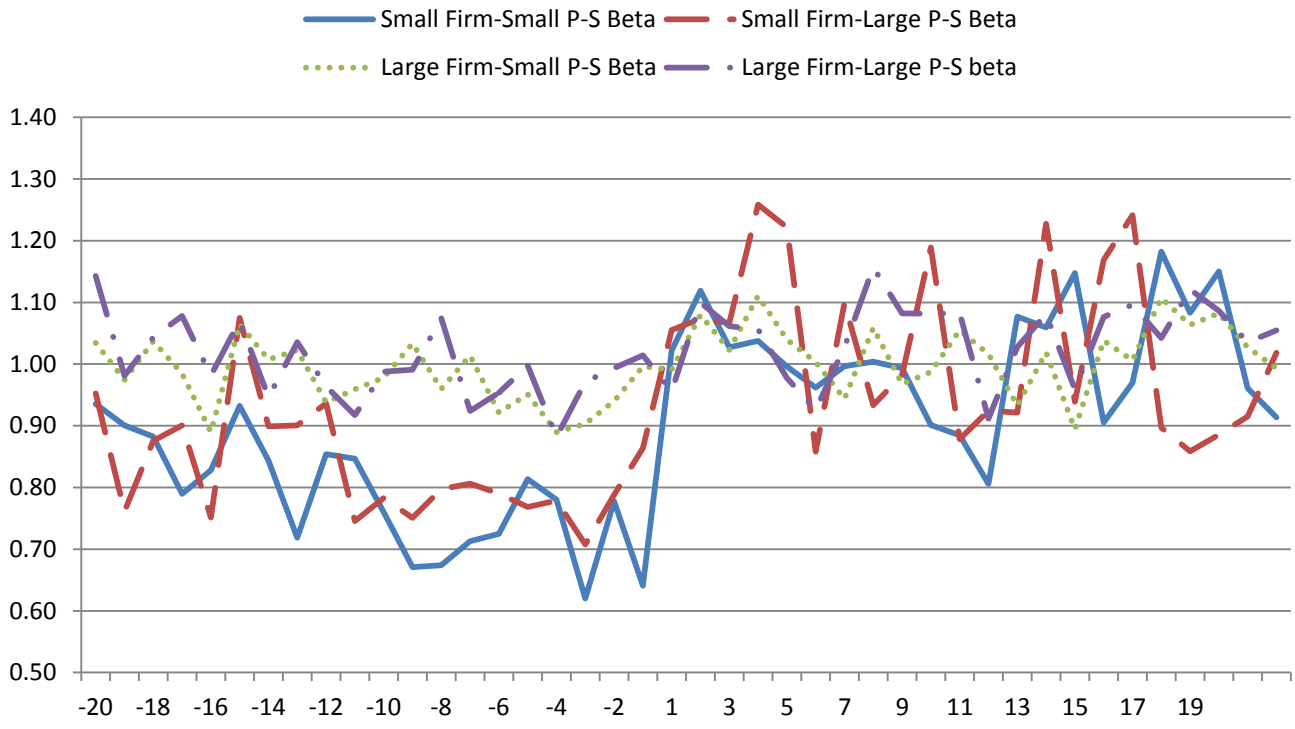


Figure 3 G(i) Buy-Sell Ratio Last Days of December First Days of January- Losers-PS

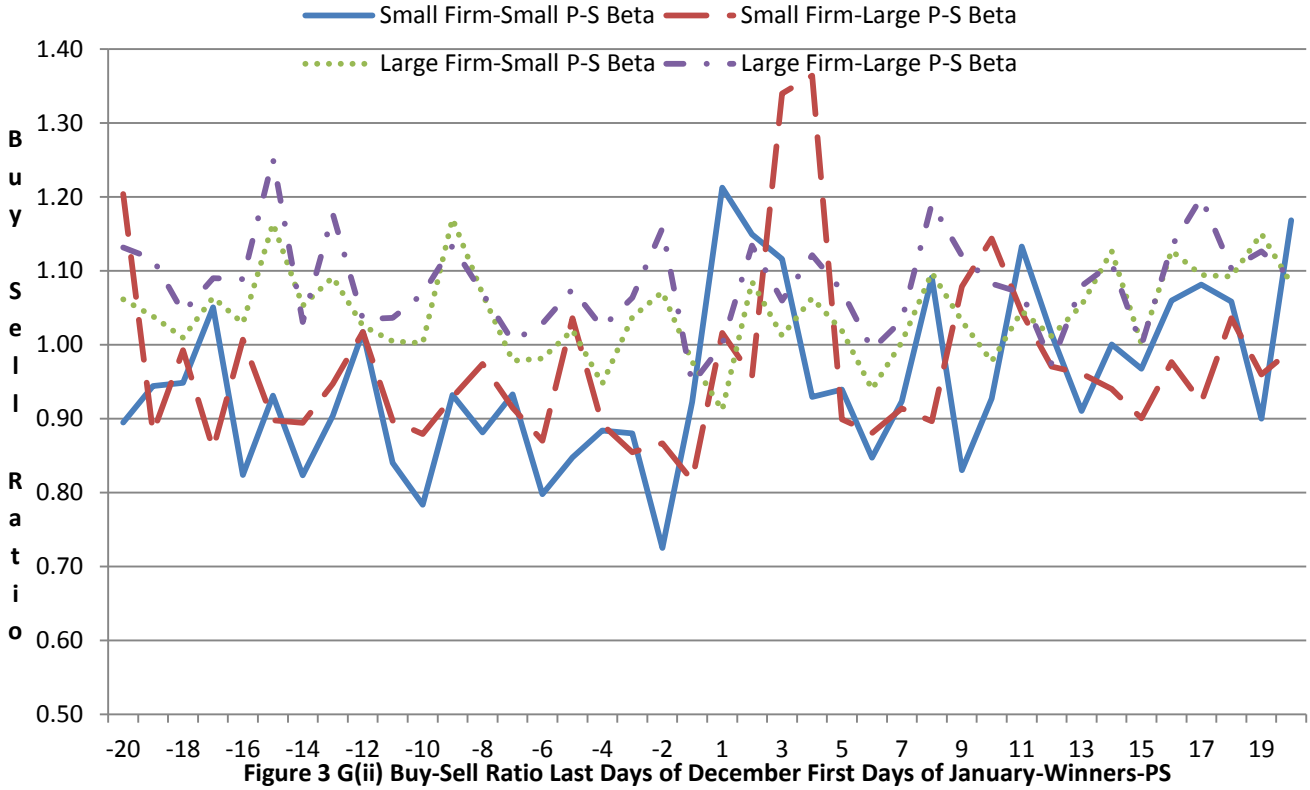


Figure 3 G(ii) Buy-Sell Ratio Last Days of December First Days of January-Winners-PS

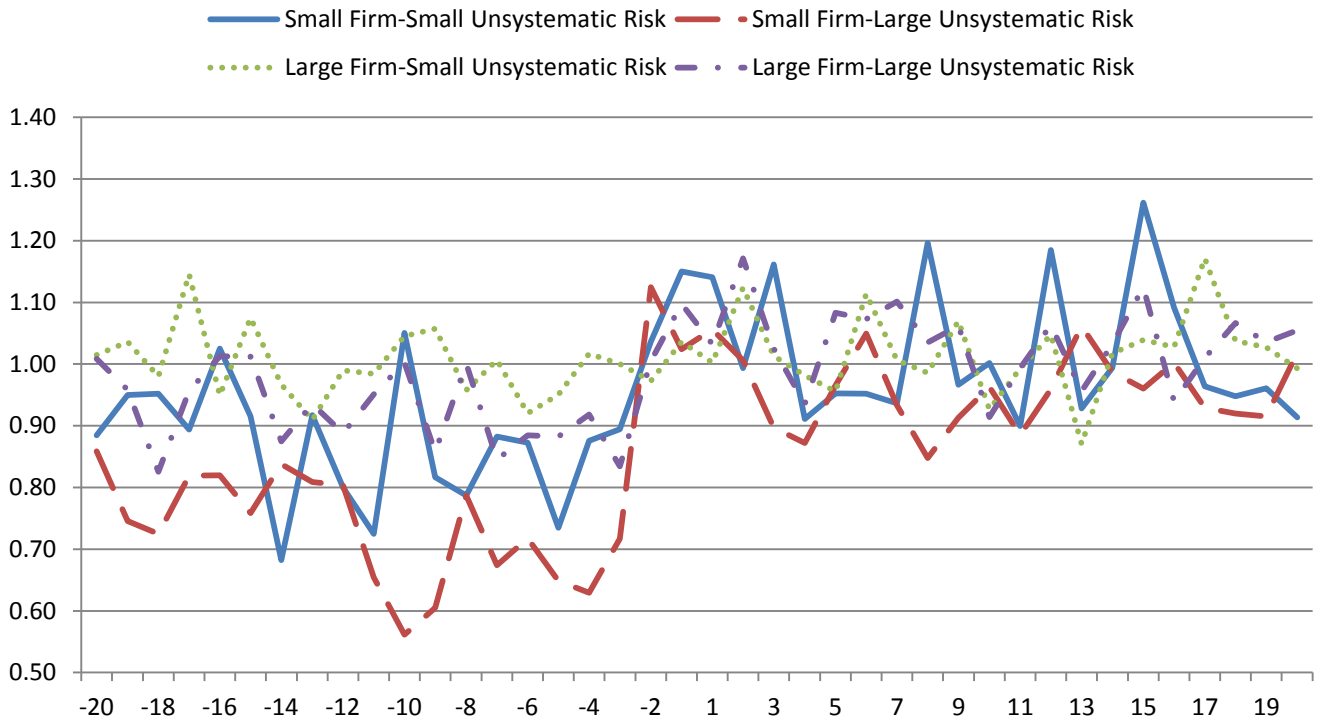


Figure 3 H(i) Last Days of December First days of January- Losers-IUnystematic Risk-

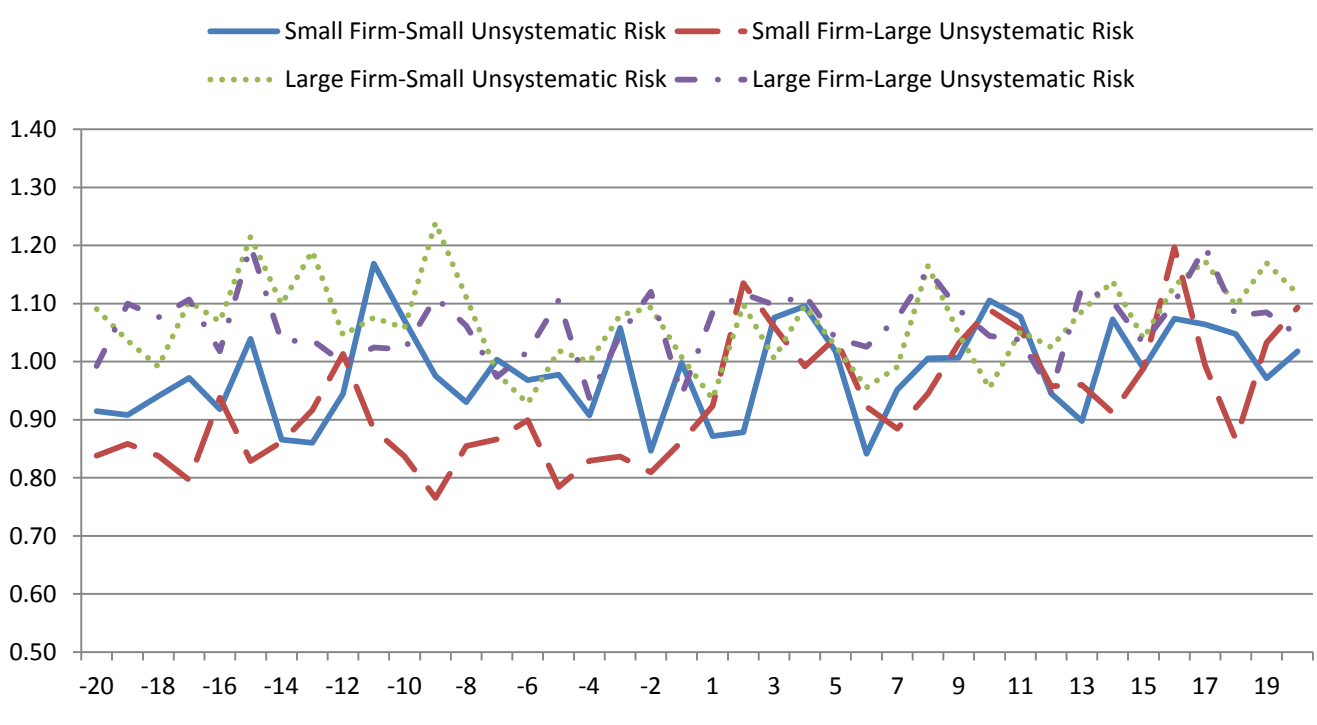


Figure 3 H (ii) Buy-Sell Ratio Last Days of December First Days of January- Winners- Unsystematic Risk -

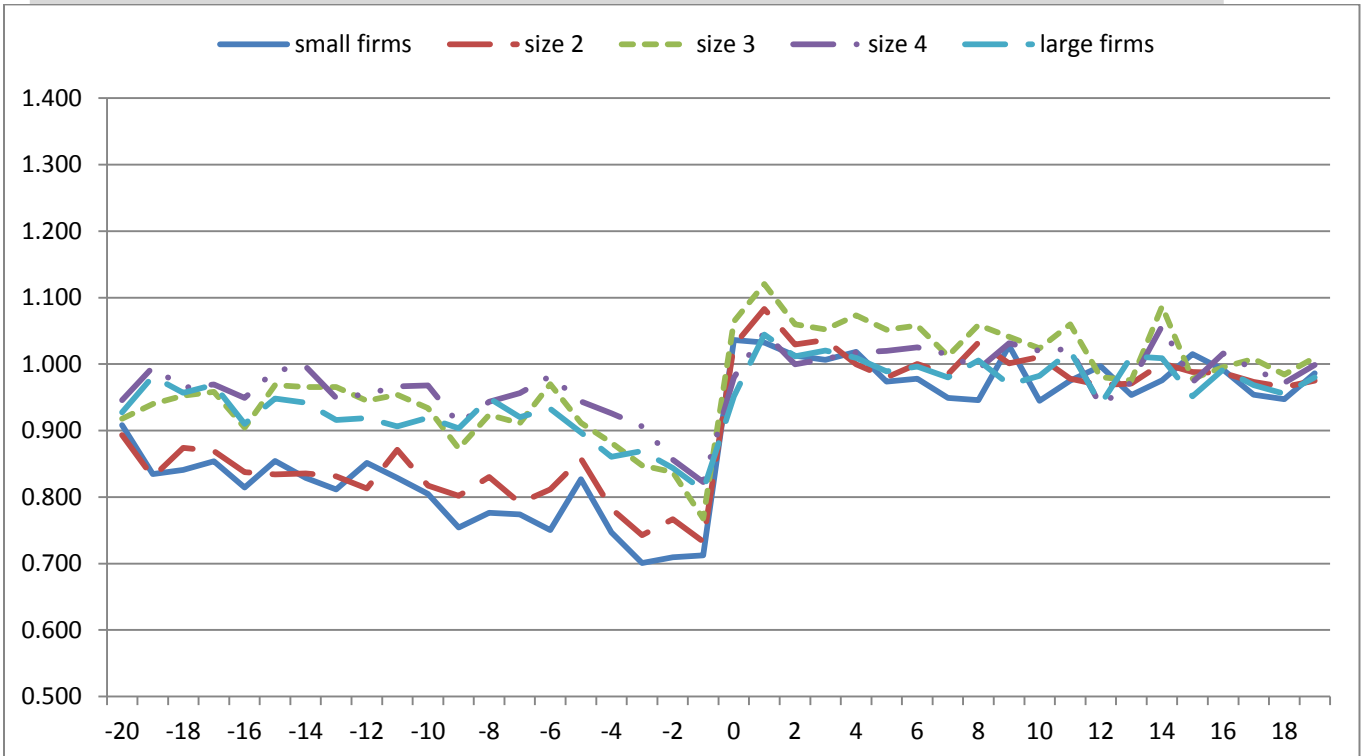


Figure 4(i) : buy/sell ratios in December and Janaury- losers-size groups -retail trades

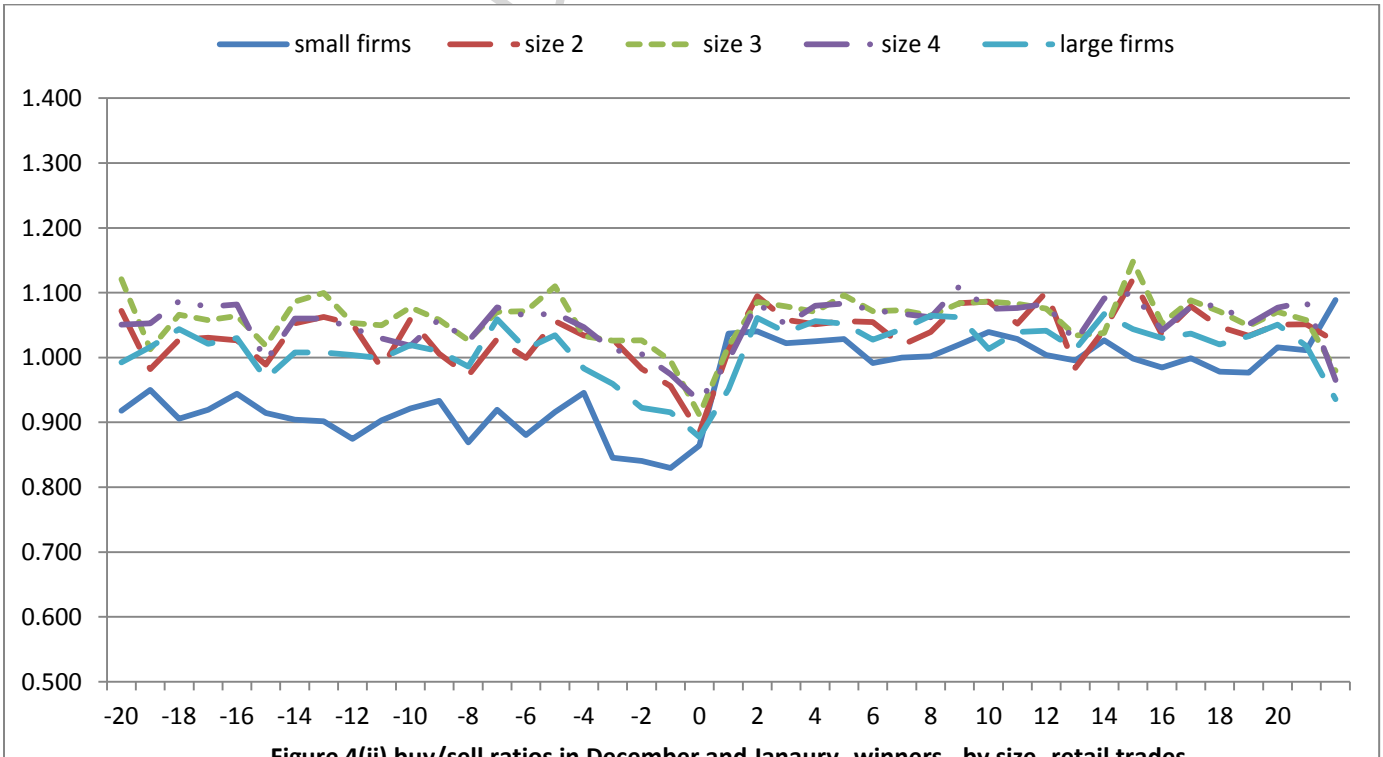


Figure 4(ii) buy/sell ratios in December and Janaury- winners - by size- retail trades

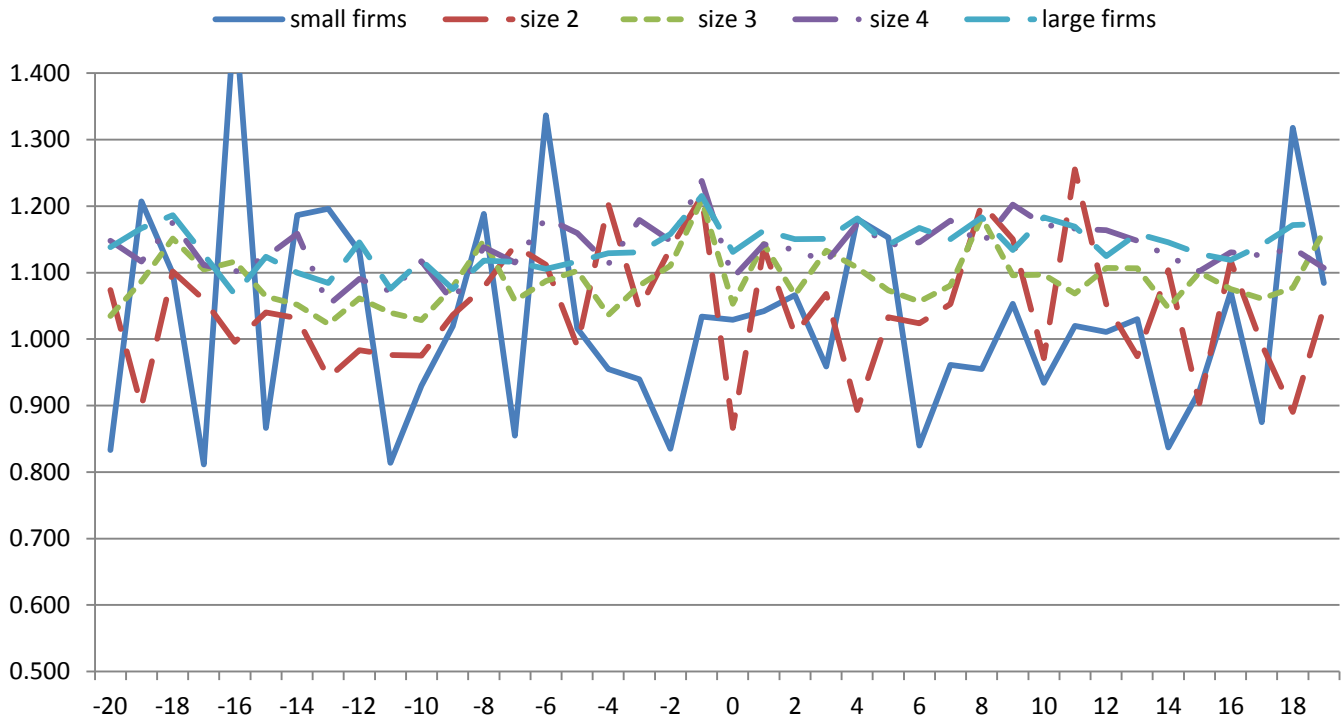


Figure 5(i) buy/sell ratios December and Janaury -losers-size groups-institutional trades

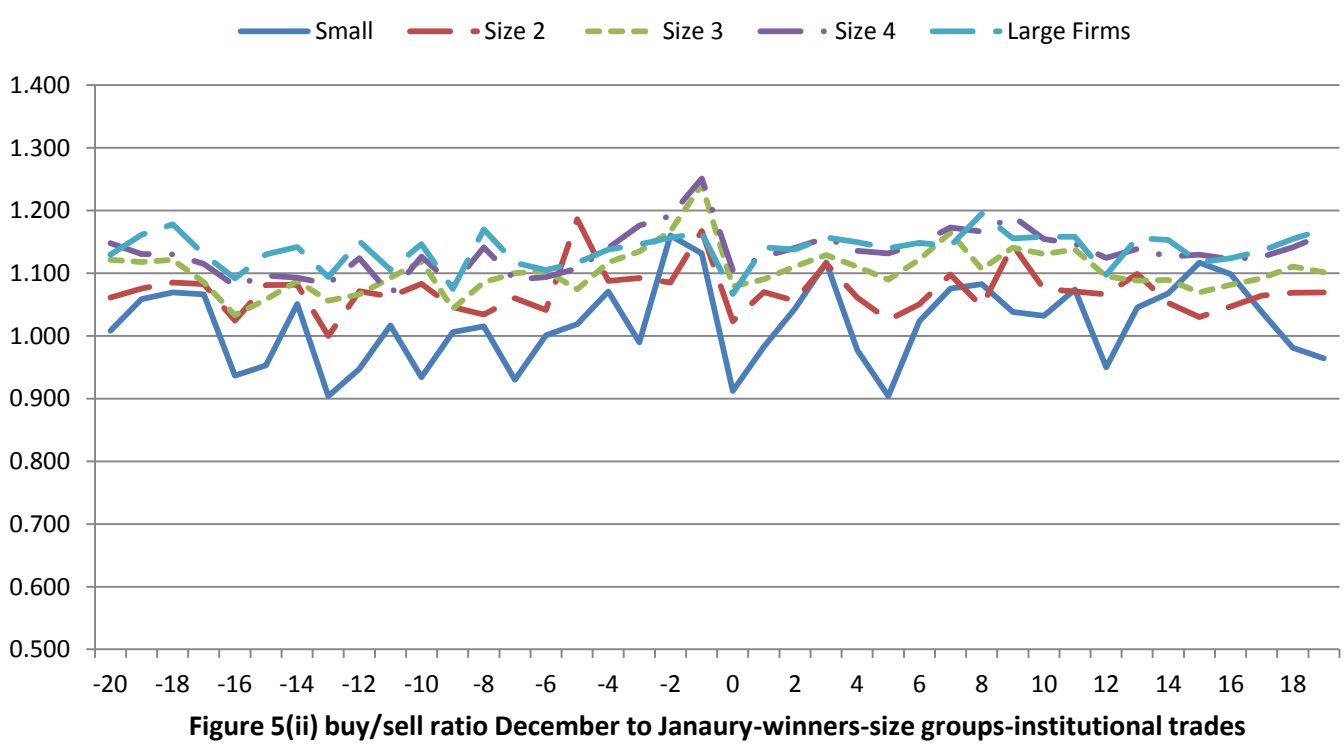


Figure 5(ii) buy/sell ratio December to Janaury-winners-size groups-institutional trades

Highlights

- There is a turn of the year effect in the order flow imbalances
- December net selling pressure is reversed in January
- Retail order flow imbalances are associated with a wide range of risk characteristics
- Institutional order flow imbalances are associated with many fewer risk variables